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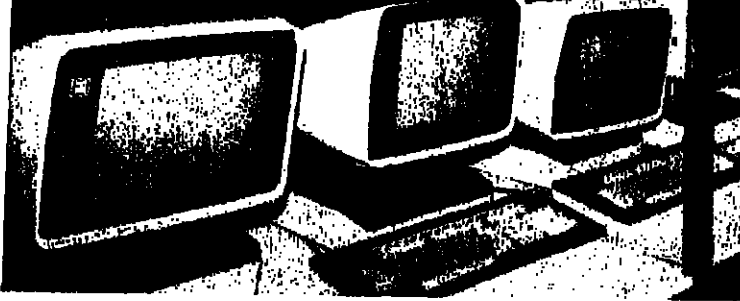


# ICL extends its clustered terminal range

by Philip Hunter

ICL has completed its series of intelligent terminal systems for local networking by introducing two new products aimed at users of its own mainframes. The first models of the series, known as the distributed resource system, DRS, were introduced last autumn to grab business from users of competitors' mainframes in local networking, and to replace the popular but ageing 1500 computer.

The new products are the DRS 20 Model 16 Interactive Video terminal, and the DRS20 Model 30 terminal cluster system. Both incorporate ICL protocols and will phase out the 7500 this year.



A cluster of new DRS20 video terminals on test at ICL's Letchworth factory.

The Model 16 is similar to the Model 10 launched earlier and is housed in the same box, but is cheaper, costing £1,550 in the UK compared with about £2,200 for the Model 10.

Model 30 systems will cost from £3,800 for a basic configuration comprising a cluster controller, video workstation and matrix printer, to £40,000 for a large clustered system with 24 video workstations and eight printers.

"We are always facing competition from small companies in this area, but I think they will have difficulty matching the prices of these new models based on common components with the earlier ones," claims an ICL spokesman.

The earlier models in the DRS range were the 10, 40 and 50 based on the 8-bit Intel range for an attack on distributed resource processing in competitors' installations.

The Models 16 and 30 are controlled by new versions of the Distributed Resource Executive software, DRX, which provides screen and keyboard control, local validation, data editing and facilities for networking.

Printed circuit boards for the new models are being built at ICL's plant in Kidsgrove and assembled at Letchworth, where the old 7500 series is now built.

## London campaign to free Soviet scientist

by Boris Sedacca

FIVE years have elapsed since the arrest of the 34-year-old Soviet computer scientist Anatoly Scharansky on a charge of treason and his subsequent imprisonment for espionage and anti-Soviet agitation.

The campaign for his release is gathering momentum and his case has been put forward as evidence of Soviet violations of human rights agreed at Helsinki, at a meeting currently taking place in Madrid, despite Soviet attempts to keep it off the agenda.

Now the London-based Women's Campaign for Soviet Jewry is planning to hold a demonstration on March 15 to mark the fifth anniversary of his arrest.

Scharansky devised a computer algorithm for a chess endgame in his master's thesis at Moscow University, an institution he entered at the age of 14.

Scharansky deliberately avoided working on classified projects but when he applied for an emigration visa to Israel in April 1973, this was refused by the Soviet authorities on grounds of his having had access to classified material.

Yet the computers which Scharansky worked on were supplied by the US under the terms of the Helsinki agreement which stipulated that they were not to be used for military purposes.

Over the following four years he served over 12 prison sentences of 12 to 15 days, all without charges, and during this time he was dismissed from the Moscow Research Institute.

He became a founder member of the Committee for the Implementation of the Helsinki Agreement in Moscow which the Soviet authorities refused to recognise, and his command of English marked him as a spokesman for foreign journalists reporting on the Soviet activists.

Scharansky was arrested on March 15, 1977, and was held incommunicado for 16 months.

In May the KGB informed Scharansky's mother that he was to be charged with espionage. The lawyer appointed by Scharansky's mother to defend him was later expelled from the Soviet Union in an attempt by the KGB to appoint a State lawyer to the defence.

In August 1977, the US Association for Computing Machinery urged computer scientists worldwide to break off relations with their Soviet counterparts.

This move was rejected in July 1978 by Professor Donald Michie, head of the machine intelligence research unit at Edinburgh University, who called on Computer Weekly's readers to sign a telegram to Soviet leader Leonid Brezhnev urging that observers from the international scientific and computing community be invited to attend the judicial proceedings.

The trial was held a few days later and Scharansky was sentenced to three years in prison followed by ten years in labour camp.

● A bursary for a "refugee scholar" at a British university is to be named after dissident Soviet scientist Dr Andrei Sakharov. The beneficiary will receive three annual payments totalling just over £3,300.



SCHARANSKY... 13 years.

where an employee is he can ask the computer to find out which control point was last activated by that person's card. And it can produce lists of who is on the site at any time.

It can also be linked to the payroll system to provide real time monitoring shift and flexitime use, and can be used to switch off heating and lighting when no one is in a room. Using additional software it can be linked with a closed circuit television system.

There is even a function which prevents a card from being used for going through the same control point twice in the same direction without having passed through a point in the reverse direction between them.

The typical price for a system with 10 control points and 1,000 access codes would be about £90,000.

No system is foolproof, however. If two people work in collusion, and one of them has a pass, then provided both parties go through a door together the system can do nothing. But stolen cards are no longer a major problem. Because the identification code is unique, as long as the loss is reported immediately the system can be told that the code is no longer operative.

## 'Big Brother' security system arrives in UK

by Kevin Pearson

A BIG Brother security monitoring system that can continuously track a person's movements is being marketed in the UK by Systemsolve and Photoscan. The system, made by Holland-based Nedap, is designed to monitor the whereabouts, in a building or complex, of employees and visitors.

To track a person it is necessary that they carry a pass card which is electronically monitored at doors, and the information is passed on to a Sperry Univac V77 computer.

The system, called Vortec, relays real time information to the computer which then decides whether the pass being monitored has the right of access to the part of the building where it has been picked up. If not, access is denied.

The pass is automatically recognised when it comes within 70cm of a control point, usually a door. It will be activated whether the card is carried in a pocket or a bag. Using the information obtained in this way Vortec constantly monitors the movements of individuals as they enter, move around within, and leave a site, the distributors claim.

Each pass is individually coded with an identification code and access authorisation.

If a manager wants to find out

## SALES BRIEF

### \$3m graphics order from Ford

FORD Motor Company has ordered 210 vector graphics workstations, costing \$3.5 million, from Lundy-Parrington, the European subsidiary of the company Lundy Electronics.

The recently launched UltraGraf workstations, which contain up to 192 Kbytes of RAM and screen memory, will be used in Ford's UK and West German factories for car body, engine and factory layout design, drawing and the facilities of its computer-aided design and manufacturing systems both in the US and Europe.

### Cobol training

WIRRAL Computer Centre, Liverpool training company, has installed a 500 Kbyte Ultra System 80 with 190 Mbytes of storage and four VDUs. It plans to use the system in a new series of 26-week courses in Cobol programming for 16 to 18 year old students sponsored by the Youth Opportunities Programme, as well as for administrative work.

### Allied addition

ALLIED Bakeries is adding a further Honeywell DPS 8 dual processor system to its Liverpool database control centre, which holds information used by 46 bakeries around the UK. The company has had one dual processor DPS 8 and 50 Honeywell Level 6 minis in operation for three years.

### Export success

SHEPFIELD-based engineering computing specialist Day Computing has won a £200,000 export order from Chemische Werke Huls of West Germany for Compaq, its planning and material control package, for use in constructing chemical plants throughout the country.

### NCR replace

ELECTROLUX subsidiary Columbus Dixon, the Wembley-based industrial floor polisher maker, has replaced its NCR 829 with another NCR machine, an 18430.

### Infra-red gauge

INFRA-RED Engineering of Maldon in Essex has won a £165,000 order from BXL Plastics of Bromborough for infra-red thickness measuring and control systems. The IR FG4 gauge will be used to measure plastic film 200 microns thick, while the IR DP4 process will produce average thickness and deviation records and set off an alarm if the upper or lower limits are exceeded.

### Supervision

THE Solartron Industrial Systems division of Schlumberger has won a £400,000 contract from the Central Electricity Generating Board for a plant supervision system at Eggborough power station in Humberside. The system will be based on five 512 Kbyte Digital Equipment PDP-11/24s running software developed on a DEC VAX-11/23 by the CEBG, using its own programming language Cebol.

### VLSI design

ITT subsidiary Standard Telecommunications Laboratories has ordered a Prime 750 to run a suite of programs it has developed for logic simulation and automatic layout in the design of linear and digital VLSI, very large scale integrated circuits.

### DG for Britvic

BRITVIC has installed a £50,000 Data General CS/50 supplied by Patel Business Systems of London to provide purchasing, supplies and other management information via terminals or a microfilm output device.

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## CSA calls for privacy Ombudsman

by David Cravner

WITH the oft-repeated call that a government White Paper on data protection is overdue, the Computing Services Association has released its own position paper which calls for an independent Ombudsman to oversee personal data administration.

The CSA has voiced the growing concern that British industry could face sanctions from other members of the European Community under the Council of Europe's Convention for the protection of privacy of the individual is ratified by the end of this year.

Home Office Minister Timothy Raison has indicated that the government is coming around to the view that there should be an independent regulator for computer systems which handle personal files.

The CSA proposals for legislation would:

- Give individuals the right to privacy of information and legal protection against its misuse;
- Require registration of personal files, except common operating files, such as payroll;
- Allow cases of alleged misuse of personal data to go to court.

Johnnie 1250



# CSA push for govt contracts irks unions

by David Craver  
A CAMPAIGN to get the UK government to spend more of its data processing budget with computer service companies could lead to confrontation with the trade unions.

The Computing Services Association, representing 190 companies, has issued the government with a five-point plan which it hopes will change what it says is its "derisory" performance in spending on computer services.

The CSA plan would lead to big turnkey projects like the Inland Revenue's computerisation of PAYE and the Department of Health and Social Security's Camelot scheme being contracted out to the private sector.

But Leslie Christie, assistant secretary of the Society of Public and Civil Servants, says: "If private computer service companies are sent in to do government work, it will not be tolerated by the union members."

Roger Graham, president of the CSA and chairman of BIS Applied

Systems, agrees that the trade unions could be a stumbling block to the procurement plan.

But he says there is no question of reducing DP employment in government, and the estimated 15,000 central government jobs should be guaranteed.

Graham adds that by working with private service companies, union members would benefit from "technology transfer."

CSA's argument for more government purchases of computer services hinges on its contention that the "UK government trails other major powers in using its position as a customer." It points to the US, where 27% of computer service companies' revenues come from federal or state agencies, and to France, where the figure is in the order of 20%.

In contrast, central government contributes only six to eight per cent in the UK, nearly 13% if the entire public sector is included, according to a survey of the top 10 UK service companies. Ministry of Defence spending does not form

part of the UK data.

For several months, a number of working parties involving CSA and the Central Computer and Telecommunications Agency, the government's buying arm, have been looking at ways to increase the participation of computer service companies.

It will be a month at least before any formal proposals come out of the working parties, but Gerald Watson, head of CCTA, says: "Yes, I am sure they will get more work."

That is because there is a shortage of resources in the Civil Service, but in any case there are very few projects of any size in which computer service companies are not already involved, he says.

There is potential for more business in facilities management, an area which has a long tradition in US government departments, but which has only been on offer in the UK over the last few years, he adds.

The trade unions, Watson agrees, are very sensitive to the



GRAHAM... Government performance "derisory" in spending on computer services.

issue, but a new technology agreement could resolve many of their worries.

Behind the CSA proposals is the belief that government data processing should be systems rather than hardware led. It calls for collaborative projects with government staff and one or more computer service companies,

multiple design contracts and the breaking down of big contracts to allow participation of smaller firms.

It also proposes the provision of more information about potential contracts, how they have been awarded, completion dates, and final costs.

Christie refutes suggestions that

civil servants might benefit from "technology transfer" by moving with private firms. He says a perturbation within the civil service is good as that in the private sector.

He would also like to see costs to justify providing claims by the CSA. "They want a greater piece of the cake," he says.

# Ethernet close to US standard acceptance

by Donald Kennett

XEROX'S campaign to establish its much-publicised Ethernet local network specification as a world standard is nearing fruition. Only minor differences separate the specification from an influential standard for high speed local networks being drawn up by the Institute of Electrical and Electronic Engineers in the US.

According to Xerox office products division vice-president David Liddle, one of the original Ethernet design team, only five technical details of the IEEE's draft proposal are still different from the Ethernet specification.

"In recent months we've come from being quite different to being very similar," said Liddle.

The IEEE is a US body but its standards are followed widely in the rest of the world. It previously endorsed Hewlett-Packard's GPIB general purpose interface bus into the IEEE 488 standard and has also put its weight behind a tidied-up version of the S-100 bus for microcomputers.

Xerox got together with Intel and Digital Equipment two years ago to promote Ethernet as a

vehicle for its future range of communicating office products and the scheme has since generated considerable interest. Out of 270 companies that have asked for licences to use the Ethernet design, 22 are developing products: five, network transceivers; nine, interface controllers; four, controller chips; three, cable; 10, systems; and 10, compatible attachments. Twenty of the 270 are in Japan and 75 in Europe.

Installations have been made at 35 sites in the US since last summer and another 60 are in process. In the UK, the first installation is due to be made this month.

One problem that arises from the differences that remain between the specification and the IEEE standard is that Intel has already committed itself to a VLSI chip design for the Ethernet controller and is planning to supply sample quantities of it before the end of the year. DEC too plans to start introducing interface products in the next few months.

The five differences are the pin layout between the transceiver and the controller, the polarity of the "collision detected" signal, the

way the packet preamble ends, the method of disabling the transceiver and the number of bits in the address field.

The IEEE allows addresses from eight bits to 36 bits in multiples of eight bits, while Ethernet has a fixed 48-bit address. The IEEE requires a disable wire to tell the transceiver to switch itself off, while Ethernet relies on the power line on its own. The IEEE requires an eight-bit pattern after the synchronising preamble before the packet starts, while Ethernet specifies a single start bit.

Draft of the IEEE 802 standard is likely to be agreed this month and published by April, Liddle said.

The Ethernet specification relates to the bottom two layers of the International Standards Organisation's seven-layer model for Open Systems Interconnection and these are generally agreed to be insufficient on their own to allow systems from different manufacturers to be interconnected.

So the companies are talking to the European Computer Manufacturers' Association about levels



LIDDLE... "From quite different to very similar."

Three and Four, the Network and Transport layers, and they claim the support of several member companies for their proposals. Beyond that, Xerox plans "a whole raft of higher level standards" for things like packetised voice messages, graphics and special applications as the need arises.

DEC and Intel also plan to publish higher level proposals, expecting all three to differ because of the different markets and types of application they serve, but they will be publicly available so that others can implement them to make their systems compatible.

# French govt orders home-made micros for secondary schools

by Jack Gee

THE first part of a large order to put microcomputers in French secondary schools has gone to two home manufacturers, Logabax and Leandor.

The Education Ministry has placed an order for 2,200 microcomputers as the first step towards a final total of 4,400.

The order marks the intention of the government to revive a school equipment programme which it suspended after taking office last summer.

Education Minister Alain Savary now seems likely to carry out "Operation 10,000 Micros" launched by his predecessor, Christian Beullac, during the presidency of Valéry Giscard d'Estaing.

About 300 high schools have been equipped with microcomputers since 1979, with an average of eight units for each school. A further 200 schools would normally have received micros this year.

The number of schools involved is now likely to be only 100. But the level of orders from computer manufacturers will reach the same

level as under the last government. The objective of "Operation 10,000 Micros", which appears to have been adopted by the government, is to use computers and line printers as aids for teaching languages, history, geography and mathematics.

Daniel Gras, a Ministry of Education official, announced that training centres, each equipped with a score of computers, will also be opened this year to train 200 teachers by Christmas.

Gras added: "The plan is to have a teacher qualified to initiate high school students in each school."

With 6,000 microcomputers scheduled for installation in French schools by the end of 1982, all the major manufacturers have been competing for orders.

Logabax, which has supplied 1,000 units since 1979, now gets an order for between 1,100 and 2,200 micros for this year. The same quantity has been ordered from Leandor, a small firm with a staff of 100 near Lille.

Leandor specialises in designing electronic equipment for laboratories and industry.

# System will support up to 250 workstations

by Robert Parry

ADDING to the range of hardware to support its specialist insurance application packages, Internet, of Dorking, is taking on UK distribution rights of an Ethernet-like network of workstations, the American Scientific Data Systems' SDS 400.

The system can support up to 250 workstations with shared access to mass storage, though a more practical limit would be around 100, according to Internet director Ken Groom. The file server can run 62 Mbytes of Winchester hard disc storage, but sub-servers can be added to the network if more shared storage is needed, Groom adds.

Each workstation, based on a 6502A microprocessor with 64K of memory, can also support up to 62 Mbytes of local hard disc storage. The practical limit on the number of workstations on the network is

set by response times for accesses to the shared mass storage. Separate networks can be linked if needed.

Application software will include word processing packages and standard commercial applications, including conversions of Internet's currently available packages for its Jacquard systems. Among these are specialist packages for managing the business of insurance syndicates at Lloyd's, for which Internet wanted more powerful systems to suit larger syndicates, says Groom.

The SDS 400 system will be launched in May, when installation and maintenance services will be operational nationwide. Internet is seeking distributors for the north of England, Scotland and Ireland and will cover the south of England itself.

Standalone workstations start from £3,500.

# Twenty dismissed - and another 20 resign at CACI consultancy

by Boris Sedacca

STAFF are beginning to leave troubled consultancy CACI of their own accord following the sackings which have taken place since last May. And at least one employee has reached the first stage of a hearing by an Industrial Tribunal on his complaint of unfair dismissal.

Over 20 people have been dismissed as part of the 40 who have left since last May.

The latest to go is Terry Wilcox, who has resigned from his post as department manager for advanced technology. "Being with CACI was unsettling," he said.

He could not cope with the loss of two bosses in six months, he added.

Wilcox formerly worked at CACI for Tony Carter, previously chief executive for European operations who was replaced last May. He is now to join Carter's

new database and telecommunications consultancy DMW.

Carter was until recently barred from recruiting former CACI staff under the terms of a non-competition agreement he signed at the time of his leaving settlement with the company.

Meanwhile, the man who replaced Carter and who was himself later sacked is resisting the terms of the leaving settlement he has been offered. Ian Palmer, former senior European vice-president, was axed by the new chief executive officer for European operations Ron Steorts, the man responsible for over 20 staff losing their jobs since last May.

One of them is Tony Yates, formerly manager of CACI's Birmingham office, who has taken his case to an industrial tribunal claiming unfair dismissal.

However, another former staff member has accepted his leaving terms. "I have come to a reasonable settlement with CACI," said Jay Metcalfe, formerly in charge of the company's legal affairs.

Throughout the staff departures over the last six weeks neither Steorts nor any other company spokesman in London has been available for comment.



CARTER... Hired his former staff from CACI.

# Getting in on the 16-bit act

by Robert Parry

SOFTWARE houses eager to get in on the 16-bit microcomputer act are racing to bring out application packages for the Sirius I, launched so, according to UK distributor ACT Microsoft, that it has placed a special order for extra machines to meet their needs.

ACT has also set up a division for the Sirius and the compatible IBM Personal Computer, both of which use the Intel 8088 microprocessor.

"We are virtually under siege," says Barry Jacques, ACT Microsoft's managing director, claiming that by the end of the year the Sirius I will have a wider range of software than any other microcomputer in this country.

The machines so far defined - "hundreds" according to ACT's Chris Buckham - are mainly gone to software developers, but they are starting to go out to end users in volume, in "shrink-wrapped software" in the form of the standard WordStar, MicroModeller and SuperCalc packages.

As well as releasing Sirius versions of these packages, ACT has transferred others, including minicomputer-based commercial software, from its turnkey unit division. On the operating system front, the IBM Personal Computer's MS-DOS from Microsoft should be available from next week.

According to Buckham, over 10 companies are working on software for the machine, headed by software houses like Compact Business and TABS. As well as commercial packages like Lotus development is under way for software-controlled add-on boards to emulate various communication protocols from Millhouse Desktop of Alton, Hampshire, and a DPM adapter from Bolton-based B and B Computers.

When the machine was launched in this country last November, designer Chuck Pettibone, who also developed the Commodore Pet - said that the marriage between Sirius and ACT, with its software strength, was needed to sell the machine.

He saw the marketing programme using it to write user-friendly applications, and the lack of interest. But traffic has remained steady and interest is as high as ever.

The most sought-after service is the French electronic news service, which offers magazine-type articles as well as news.

# Brazil threatens to pull out of Third World aid

by Rory Johnston

A MAJOR threat is hanging over the intergovernmental Bureau for Informatics and its \$1 billion plan for computers for the Third World. One of the IBI's most important member states, Brazil, is thinking of pulling out because it is getting too little return for its money.

Brazil has been contributing \$600,000 a year to the Rome-based international body and getting only \$10,000 worth of benefit.

To assuage the Brazilians, the IBI is trying to put together a plan for a microelectronics research laboratory in that country. If this comes about by the end of the year there could be a change of heart in Brazil.

The laboratory would be set up in the capital, Brasilia, and would

be open to all member governments of the IBI. The bureau's director, the Argentinian Fernán Bernasconi, is looking for ways of finding the money in his current budget.

As to the overall \$1 billion programme, Bernasconi describes himself as "quite confident" of success. He has already collected a number of projects for it from both developing and developed countries.

His relations with UNESCO, strained last year when the UN agency accused the IBI of encroaching on its territory, are improving, he says. Conflict is being eased by discussions on co-operation starting this month, and UNESCO director Amadou Mahtar M'bow is due to visit Rome in April to approve the joint plans that will have been worked out.

# Teletel trial success with young families

by Jack Gee

TELETEL, the French videotex experiment now under way in a Paris suburban district, has opened with 96% efficiency during its first six months in service.

Pierre Desreux, regional director of telecommunications, said: "We have recorded a technical failure rate of only 4%. This is very encouraging."

The Teletel experiment has involved the installation of terminals in 2,200 homes around Versailles. Residents are making an average of two calls weekly from each terminal, with a duration on average of 15 minutes per call, during which they consult three or four of the 150 information services available.

Teletel is much more popular among young couples with children than with the elderly. Middle class residents make considerably more calls than working class families.

Teletel promotion chief Dominique Lanchère said: "We were told that after a few months the novelty of Teletel would give way to a lack of interest. But traffic has remained steady and interest is as high as ever."

The French electronic news service, which offers magazine-type articles as well as news.

# Cellular radio services for New York

by Donald Kennett

COMMUNICATION services based on the novel technique of cellular radio are planned by a New York company being set up by three former officers of the Federal Communications Commission, the US telecommunications and broadcasting regulatory body.

Cellular radio is a technique devised to increase the number of people able to communicate over a given set of frequencies. This is done by dividing up an area into cells into which transmissions with a limited range are made. The scheme has been adopted by the Mercury alternative telecommunications network in the UK as a fast way of setting up links to customers' premises.

The FCC has confirmed the arrangements it proposed last April for licensing cellular radio services. Under them, frequencies would be allocated to two competing services in each area, one of them provided by a telephone company.

The new company is called Cellular Communications and its president is William Ginsburg, former FCC deputy chief for policy. Charles Ferris, former FCC chairman, and Thomas Casey, former deputy chief for operations, are among the principals.

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These are expected to reach 2,000 civil servants by the end of 1982. Other one-day courses for senior staff on topics like "the impact of microcomputers" will be provided by the Civil Service College itself.

There are also changes in courses for civil servants directly involved in data processing. A package of commercial systems design has been brought in and will be adapted to the needs of government projects under the guidance of CCTA.

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## Centronics has high hopes for colour printer

by Philip Hunter  
AN advanced colour printer is close to completion at Centronics, the world's second largest printer manufacturer.

An announcement is expected soon as one of a series of moves aimed at restoring profitability to the financially sick giant.

The colour printer will be based on a new impact method of putting marks on paper. "Colours can't be printed with dot matrix printers," explained Terence Harris, vice-president of European operations.

"You can't get the dots close enough, and if you have them closer, you get into problems with bending of the impact wires and unreliability."

Centronics recently revealed its long-term view of the printer market and believes that colour will play a vital role in the office systems and small business areas, in

parallel with the continuing development of quiet printers.

It expects to announce the much talked about Quiet Writer at the end of the year for the small business market. This uses a stylus attached to a flexible frame, which can be programmed to enable, in principle, the printing of any style of character. Centronics has already introduced the first of a range of quiet printers and announced the 350 series, a new range of dot matrix printers, which replaced the obsolete 700 series last November.

The company blames last year's losses on manufacturing mismanagement, inventory write-offs, and high interest charges on previous debts. These problems have been allayed by a recent deal in which Control Data stepped in to invest \$24 million and its 60% of its subsidiary Computer Peripherals Inc (CPI) in Centronics in



HARRIS... New method of colour printing.

return for 35.5% of Centronics shares.

Control Data claims that it approved the deal to give itself access to a wide spectrum of printers. "Centronics is strong in medium and slow printers, while CPI pro-

duces fast printers," says a Control Data spokesman.

However, CDC has not made a success of selling its printers, and is reckoned to be relieved to surrender the marketing of them to Centronics.

## 560% rise in distributed data processing market by 1986 - IDC

by Andrew Thomas

THE Western European market for distributed data processing (DDP) will rise 560% from \$300 million in 1980 to \$2.8 billion in 1986, when almost 20% of small processors will be used for distributed intelligence, compared with under 10% at the beginning of the decade, says a report\* from International Data Corporation.

IDC says that 42% of the revenue from the DDP market now comes from clustered terminal systems, and that by 1986 they will account for 50%. Minicomputers will continue to decrease in importance.

DDP environments will provide the largest market for clustered terminals, rising from 49% in 1980 to 70% in four years' time.

In 1980, the number of screens delivered for use in clustered terminal systems was 43,000 units. With an average value of \$10,000, this represents a total revenue of \$430 million. IDC predicts that, by 1986, there will be an increase to 200,000 units, giving \$2,000 million.

At present the market is shared between a variety of European and US manufacturers, but IDC sees

the IBM 8100 having a significant effect, gaining up to 60% share, with 70% of the units being installed in DDP environments.

IDC describes the 8100 as a "slow starter," which is beginning to make its presence felt in the marketplace. The total number of clusters shipped in 1980 was 800, but by 1986 this figure could be as high as 17,000.

The UK, France and West Germany account for almost two-thirds of the European DDP market, with West Germany slightly ahead. This is unlikely to change by 1986, despite the IBM penetration of smaller countries.

The report cites user enthusiasm as a common problem, with first time users expecting too much of their new systems, but the provision of hardware and software support at remote sites also causes difficulties.

Most users moving to DDP tend to add small processors to their configurations rather than replacing their mainframes, and a significant 60% remained with the same hardware supplier.

\* Terminal Markets in the Distributed Data Processing Environment - Western Europe, IDC Europe Ltd, 2 Red Lion, London W1N 1LN, £1,250.

## Japanese memory leapfrog

by Kevin Cahill

IN an expensive game of leapfrog, Japanese microelectronics manufacturer Toshiba has abandoned the race to produce the next generation of dynamic memory chips with 256K capacity.

Instead, the company is planning to invest 20 billion yen in a plant which is designed to deliver one-megabyte chips in volume by the end of 1984.

An experimental one-Mbyte RAM is expected to be available some time in 1983.

The common explanation for the direction now being taken by one of Japan's leading semiconductor manufacturers is that it is conserving resources. Toshiba seems to be hoping that its principal Japanese competitors will be concentrating on 256K chips, while Toshiba itself is busy cornering the next advance in the memory market.

There is a precedent for this. During the VLSI project, on which Japanese computer companies spent around £120 million, Oki Electronics was ignored because of its minuscule presence in the semiconductor business.

While the project was under way, Oki set up its own chip manufacturing plant, but effectively bypassed the existing industry standard 4K and 16K and began operations by mass producing the next generation of chips, with 64K capacity.

Although most of Oki's (DRAM) production is still used internally, the decision to concentrate on the next generation of chips ahead of existing producers pushed the company from nowhere to about the fourth place in the league of Japanese chip producers.

And the company used this base to develop a 256K DRAM of its own parallel with the companies which took out patents from the 26K VLSI project.

Oki began delivery of sample 26K DRAMs last September and certainly looks set to be among the top three or four producers in Japan, if not the world, when the 26K is the industry standard.

With rivals NEC and Hitachi moving production of 64K DRAMs to one million a month, and Hitachi determined to mass produce 256K DRAMs late this year, Toshiba has obviously decided on a variation of the Oki strategy and gone for the next generation.



PANTON... Lawsuit ended relationship with ECS.

## Telecomputing romps through the £2m barrier - despite the lawsuits

by Kevin Cahill

TELECOMPUTING Holdings has put its legal wars with ICL and ECS Microsystems behind it and turned in sales of £2.03 million, up £430,000, in the year ended September 31, 1981.

Last year Telecomputing was awarded over £750,000 from ICL - £400,000 in cash and £350,000 in credits - after ICL breached its agreement to supply Telecomputing's TP monitor software. Micro supplier ECS had its claim of £400,000 against Telecomputing withdrawn on appeal. Neither of these amounts appears in the sales figures.

The second victory soured the commercial relationships between the two companies according to Telecomputing chairman Bernard Panton, and Telecomputing is no longer selling ECS equipment.

Profits were trimmed to a slim £20,138 last year after Telecomputing Systems Ltd, a subsidiary company, had been written off last August at a cost of £244,000.

The residue of Telecomputing Systems Ltd has been transformed into a joint venture between Telecomputing Holdings and some of the former engineers and staff. It now trades as Telecomputing Microsystems Ltd.

A decision on a replacement supplier for ECS has not yet been taken by Telecomputing Microsystems, according to Panton.

The first quarter of the current financial year has restored the company to a healthy profit of £64,462 on turnover of £392,000. Panton is predicting that it will once again break the £2 million barrier in 1982, with profits on target at £250,000.

The company has re-established a working relationship with ICL, and recently bought a ME29 via the credit established as part of the legal settlement.

One of the ICL bureaux in South Africa has also bought two of Telecomputing's TP monitors. This year the company will

launch new versions of the TP monitor TPS, and both Panton and Telecomputing's technical director John Garrick expect to win substantial orders. TPS is already running in two sites.

Garrick says that there is severe criticism of the ICL TP offering TPMS on the VME operating system, and on the TME/TP software when working in isolation, not to mention when they are required to work in a network such as IPA.

"The new TPS, on the other hand, provides uniform user interface, and the old 1900 image is gone," he said.

### Novel service

BOC Datasolve is to offer an IBM 4300 service based on its Arndahl and IBM large mainframe computers. In a novel approach the company is offering a service which simulates a 4300 in the user's office. Prices start at around £6,000 a month.

## Protocol conversions

by Boris Sedacca

THE Tower of Babel created by manufacturers of office equipment adopting different interfacing methods has created a market for devices to translate the signals between pieces of equipment. A new company, Jaguar Communications, has been established for the primary purpose of tapping this market.

Its managing director, Martin Hewitt, says there will continue to be an enormous demand for protocol conversion devices until all manufacturers of computers and terminal equipment conform to a

single communications protocol. "Many UK companies have tremendous expertise in the field of protocol conversion, but lack the resources to market their end product effectively," he said.

"They produce devices on a project basis for a single customer but are not always aware of their potential because these devices are often based on sophisticated hardware designs."

Hewitt claims that his company's independence from any single manufacturer allows him to match the user's needs at the right price.

## SDP view on subsidies

by our Parliamentary Correspondent

SOCIAL Democrat MP Shirley Williams has come out for the controversial proposal that the government's employment subsidies (rather than investment subsidies) should be scaled according to the value of the jobs created.

This is so that there would be a bigger subsidy for highly skilled jobs in order to attract the technologically sophisticated, skill-intensive firms which the country needs.

She believes that such a selective

policy would encourage the new technologies to flourish.

But that would not be enough. They would have to be supported by a wider range of policies including training for new skills, adequate venture finance for small high technology companies, faster response to planning permission applications and a programme of government regulation and public purchasing to encourage innovation.

Mrs Williams has also called for management systems appropriate to the new technology.

## Raytheon plans fast ICs site

DEVELOPMENT and production of very high-speed integrated circuits is planned for a new microcircuit factory to be built by Raytheon.

The site is next to the company's manufacturing plant in Andover, Massachusetts, and will supplement existing semiconductor production at Mountain View, California. Devices produced at the new

plant will be for internal use in Raytheon's defence systems products and, eventually, commercial electronic products. They will be used as signal and data processors, logic units and computing modules.

Building should be completed by mid-1984, when it is expected that about 30 new jobs will be created. Total staff for the plant will be about 100.

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Computing ..... Men's teams ..... Women's teams

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## Computastars entries close next week

by Andrew Thomas  
ENTRIES for Computastars are now well past the 50 mark, with the London and Birmingham heats proving the most popular so far. The small units section is filling up quickly, with some of last year's main competition entrants moving into this new category. Dealing from Manchester, who were in the top ten team last year, is one of these, and must be in with a good chance of the small units title.

Billy parties are now a feature of the competition, and it is expected that the 1982 edition of Computer Weekly's I am offering a special award for the wildest - a signed photograph of myself. Second prize, two photos.

From runners so far are the Olivetti Elphinstone (sic), the Flying Grimaldi Brothers from Flossmoor, the Capricorn Killers, and the current leader from BOC, the Datasolve Superstars (A men's team).

You tell 'em, until Friday, March 19, to get your entries in, and you can find full details of the rules and regulations in the February 11 edition of Computer Weekly.

Jeff Harrison of Kalamazoo in last year's Dutch final.

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## IBM 4300 needs support - Altergo aims to give it

by Boris Sedacca

AN over-ambitious claim by IBM that its popular 4300 series mainframes would cut out an expensive middleman, the systems programmer, has not materialised. Systems house Altergo plans to capitalise on this with a new service for users.

To achieve its aims, IBM announced its System Installation Productivity Option/Extended, a piece of software which provided users with a ready-made operating system environment for configuring a standard set of software products.

But time has shown that a systems programming function is needed for 4300s, although most 4300 installations are too small to need the services of a full-time system programmer.

Altergo sees a market gap here. "I think IBM oversold SIPO when it first launched the 4300 series," said Dick Jones, Altergo's managing director.

The company has now introduced a systems engineering service to bridge that gap. "We are

offering scheduled visits for software maintenance, but we can also send in our people for longer periods, if for example the user wants to carry out a major enhancement. They do basically all the normal jobs that an in-house systems programmer would be doing."

Jones says that a typical IBM 4331 user will contract for about one day a week, although the company will allow for a minimum visit frequency of one a month.

"It depends on the type of work the user is running. If he is using



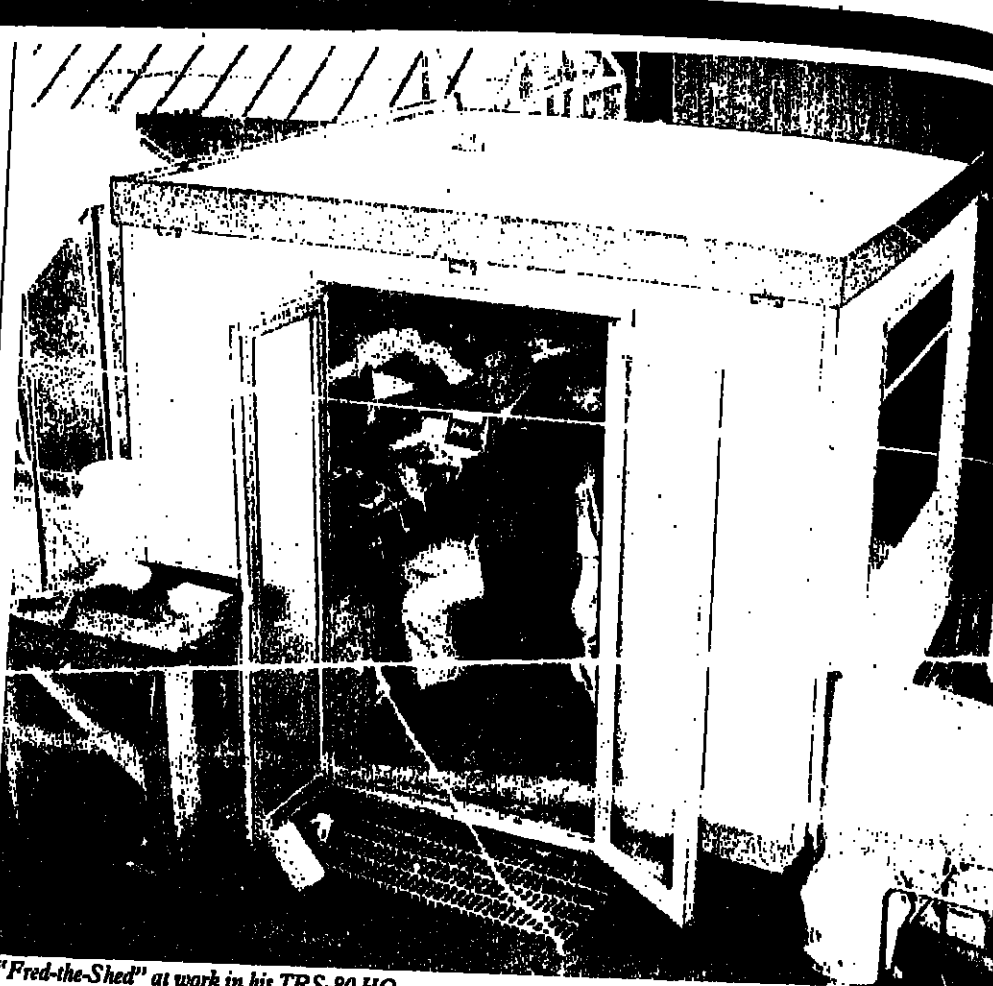
JONES: "IBM oversold SIPO."

his system as an applications machine with a low level of systems development then one or two days a week, or maybe even one day a fortnight should suffice," he said.

The service is available to any IBM 4300 mainframe installation supporting VM/CMS, DOS/VSE or OS/VSE. A range of options, including software consultancy, installation and maintenance, trouble shooting, and specialist programming services, is offered.

It also covers system tuning to reduce I/O contention and enhance system performance, and system tailoring to ensure that the required facilities are available with the minimum overhead.

These services are less likely to be necessary on IBM's new 4321 because IBM appears to have got its act together better here. The 4321 operating system, Small System Executive (SSE), is a cut-down version of DOS/VSE with restricted facilities, so it goes much further down the road of cutting out the system programmer.



"Fred-the-Shed" at work in his TRS-80 HQ.

## Bulletin boards could edge out Prestel

by Maggie McLening

PRIVATE viewdata services are growing rapidly in popularity and could corner the market for local or specialist information, leaving Prestel out on an expensive limb.

When Prestel first started, British Telecom promised to cut telephone charges for Prestel, which might have alleviated the high cost of use, but this has not happened.

The result of this and other factors has been a markedly rapid reaction to the service from the public, and a spate of home-grown viewdata software from a few enterprising companies and individuals.

One such individual is Fred Brown, the UK pioneer of the bulletin board system for microcomputer users, which offers advertising and "shopping by computer" facilities in addition to a message service.

Operating from the unlikely headquarters of a garden shed in Hull in which is housed Brown's Tandy TRS-80, this service has users from Holland, Cyprus, France, Denmark, Sweden, Austria and the UK, plus a very strong following in the US.

Known locally as "Fred-the-Shed" from the days when he used to build garden sheds, Brown is a roofing contractor by trade and also owns a shop called 3-Line Computing from which he sells Tandy equipment and a wide range of software, including his own.

"The bulletin board is really my hobby," he explained. "I opened the shop to help pay for it."

Electronics has always been one of his interests, and he claims to have been only the third person in Hull to get a TRS-80 by 1979. It was originally bought to help with accounts for the roofing business, but a holiday in California gave Brown the idea for the bulletin board.

He brought back a copy of Forum-80, the networking program

widely used in the US, and adapted it for his TRS-80. From this, he then developed his own Mailbox-80 software, which is now in use at Tandy's head office at Walsall and throughout its distributorship chain.

Other manufacturers, such as Commodore and Apple, have been round to glean ideas for their own systems, and Commodore has recently launched the Compet service for Pet users. This, however, is not free of charge, as Brown's is.

"My system was England's first public electronic mail system. It's been running 18 months now," commented Brown. He is full of ideas about the uses to which it could be put.

"A system could be accessed by local farmers or doctors, then it could be updated free by drug or chemical companies," he suggested.

Mailbox-80 differs from Forum-80 in execution because it is one large program, instead of some 70 modules, which Brown considers makes it more efficient. Both systems store configuration details for each user, so that they respond with the correct control codes in machines as varied as the Apple, Atari, Videotex, Commodore Vis and the TRS-80. They both will also inform a user of any messages waiting for him when he logs on.

The cost of setting up the "host" of the network is £1,500, which includes a TRS-80 Level II with 48K RAM and 2 disc drives. Further equipment costs are minimal, being the price of a modem and terminal for each user.

Brown is optimistic that such a system has a strong future in the UK.

"Looking at what's happening in the States, I think this should catch on here far more than Prestel once the small businessman becomes aware of it," he said. "I know the equipment is cheaper in the US, but it's now getting cheaper here too, and there'll soon be far more people with computers at home."

## Micro project management

by Boris Sedacca

PROJECT management, an application which has for many years been the exclusive preserve of the finding its way onto micros.

Thornicroft Manby Services, a Leatherhead-based bureau and software house, has now launched a micro-based project management package called T-Pert to run on

the CP/M operating system for micros.

Micros are slow but users trade off this inconvenience against that of waiting for work to be returned from the bureau or of hooking up to a time sharing service.

T-Pert allows a user to analyse and monitor up to 750 activities. It is written in Fortran and needs 64K of memory.

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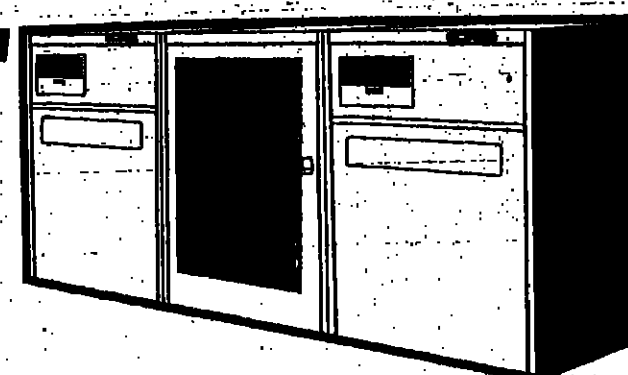
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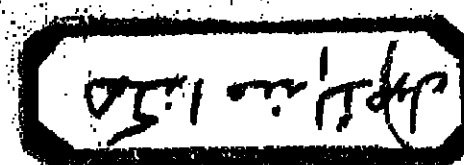
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# Perils of paying too much to get more reliability than anyone cares about

The Ninth Law of Reliability: Investment in reliability will increase until it exceeds the probable cost of errors, or until somebody insists on getting some useful work done.

THERE is a practical, economic limit to how much reliability we should build into a given system. If we let young idealists loose on a programmed system, we can expect them to continue debugging the programs, trying to make the programs perfect. This could take infinite time since nobody knows how to do it.

Fortunately, even young idealists tire of debugging, and they will stop doing so before the program is perfect. But, if we let them stop based on when they tire, we might get far less reliability than our application requires. Not all idealists are equally energetic.

The management answer to these problems is to determine how much reliability you need and can pay for, and to specify the required reliability level in measurable terms.

You might well ask how much reliability you can get for your money. The first issue is to determine a lowest acceptable level of reliability. This is the level below which the system user cannot and will not accept using the system.

A simple estimate would be the present "old" system level of reliability, if the user is satisfied with it. Why should the user tolerate worse in a new system?

Next, determine if any improvement is desired, and if so, how much. This forms the basis for the planned level of reliability in your new system.

The system designer then has to determine whether the planned level of reliability is technically feasible, and economically acceptable to the user. This may involve putting together a series of technical design decisions. For example:

Use Fagan's inspection, test all paths in modules, build a deep database diagnosis program, and use distinct software plus a checking supervisor to detect and correct errors in operation.

If the solution you propose seems technically adequate (it will probably meet your planned level of reliability) then you can build it provided the estimated costs are still acceptable to the user.

If you cannot find a feasible technical solution, or if the costs are unacceptable to the user, you must find a lower level of reliability which meets both these criteria, or you must search for more cost-effective technical solutions than you have been evaluating up to now.

The technical designer should primarily feel responsible for giving the system user-buyer a choice in the form of a curve of the reliability versus cost levels which can be bought. The user then can pick a point on the curve which satisfies his needs, and the developers can go ahead.

Reliability, in general terms, is the probability of the system doing what the designers planned it should do. There are consequently

many possible measures of reliability for most systems.

It is always necessary to make a reliability definition of the planned reliability for a system. The usual criteria are related to correctness of output, accuracy of output, timeliness of output, and availability of the system. These apply separately to all critical components of the system.

In the eyes of the user, it is the entire system that matters. So we must not fall into the trap of narrowly planning 'program reliability' and leaving the other items to chance.

are unacceptable to the user, you must find a lower level of reliability which meets both these criteria, or you must search for more cost-effective technical solutions than you have been evaluating up to now.

The technical designer should primarily feel responsible for giving the system user-buyer a choice in the form of a curve of the reliability versus cost levels which can be bought. The user then can pick a point on the curve which satisfies his needs, and the developers can go ahead.



Tom Gibb is an independent consultant, lecturer and author on computing topics.

I have received from a major British corporation: "...will require work to ensure the availability and accuracy of data..." This contains no hint (in the entire six-page memo stating requirements for a major new production planning system) of the present levels of availability and accuracy, or of the future planned levels.

If these well-intended words are to have any effect in practice, we must, from the start, define them in terms of measurable concepts.

If we do not, there is every danger of the Ninth Law giving us less reliability than we really want, or of having to pay far too much to get more reliability than anybody cares about.

It is unacceptable in systems planning to see statements such as

SITA high-level network for transmitting seat reservations... A new London computing centre has been opened by SIA in conjunction with Computer Consortium Services...

The order, valued at £1.3 million, covers the supply of over 1,000 VDUs and 572 character printers for use in a stores management system being developed for the RAF.

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## Service men top the DP hit list

SHOULD an industry pull be held to discover the major area of trial and tribulation in the computer industry, maintenance and service would surely come out on top. For once the opinions of computer management, DP teams and users would be united in pointing the finger at engineering services as being No 1 on the hit list.

With hardware costs declining it can be forecast, without the need for a poll, that computer equipment is becoming available to a much wider user base. As demand for computer power increases, so too does the related demand for engineers.

But for once in the computer industry, the normal law of supply and demand does not fully apply. Demand tends to outstrip supply with companies such as IBM having to meet not only their own demand, but those of the recruitment marketplace.

Many DP managers could be regretting that they did not take the engineering trail and study for the City and Guilds rather than the IDPM exam. Recent advertisements in the national and trade Press for experienced engineers suggest that only those with a taste for a Porsche, a mews cottage in Kensington and membership of the Embassy Club need apply.

Computer maintenance has become very big business. A recent survey claims that one leading supplier earns 15% of its profits from maintenance services. This could raise the comment that it is the non-provision of service which contributes to the profit base. Too often users become frustrated at the length of response time and the subsequent inability of the engineer to fix anything more involved than a fuse or tape drive window.

The time when the sales and service manager worked on the same side seems long past. No longer can the user rely on his equipment faults being relayed back to the sales manager, producing not only a prompt visit but a promise of lunch. Now each side seems determined to refute the other.

The main suppliers have got the service message. Response time guarantees are now being offered with the establishment of fault diagnostic centres. By means of a toll free connection, the user has the service of a round-the-clock problem centre which can often identify the problem without the need for an on-site engineer. In most cases the user can replace the faulty unit or be assured that the engineer on his way has been fully briefed.

Given an annual maintenance service turnover of \$3,000m for IBM alone, there would seem no excuse for manufacturers to offer a sub-standard service - even if the service alarm bells ring at 4.30pm on a Bank Holiday Friday.

Alan Simpson

Alan Simpson

Alan Simpson

Alan Simpson

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Alan Simpson

## ComputerWeekly

Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS  
Thursday, March 11, 1982

### Legitimate help or subsidy?

A CAMPAIGN launched by the Computing Services Association to press the government to spend more money with CSA members fits nicely into two planks of the government's strategy: to cut the size of the Civil Service and to switch jobs from public to private sectors.

The public sector in question here is DP spending directed by the Central Computer and Telecommunications Agency (CCTA). The policy wanted is one of "enlightened" procurement. (It seems that Kenneth Baker's euphemistic language has spilled over from the Department of Industry to infect the CSA.)

The CSA believes that by making greater use of outside service companies, the public purse would receive the benefit of the productivity gains it claims for thrusting private business.

Its request for a policy on government spending on software is made from an apparent position of strength. The CSA quotes a 25% compound growth rate for UK service companies between 1971 and 1980, which has taken revenues for the sector from £69 million to over £500 million.

But the companies complain their success has been without the help of business they should receive from the government. The CSA points to the US where government spending on outside services comes to over \$4 billion, or 27% of their total billings. In France the figure is something over 20%. Compare that with CCTA spending in 1979-80 of £12 million, or under 3% of sales.

CSA members claim that without government support via a new procurement policy, British software and other service companies risk losing international competitiveness. They say that the most lucrative areas for new business are in health, education and energy, but that they are not getting enough experience in developing all-important reference sites at home. Without them, they are handicapped in chasing work abroad.

But why shouldn't the government do its own programming, after all? Doesn't the call for support for the CSA smack of subsidy?

The CSA would justifiably be indignant if it was lumped together with less fortunate chunks of British industry in needing government work to survive - The "Buy British" not because it's best but because our old-fashioned business will go under if you don't" syndrome. Clearly, its members are not in that class.

It does, however, run the risk of stirring up powerful antagonism. On launching their campaign, CSA leaders made passing reference to its impact on government employment.

The jobs of the estimated 15,000 staff in government data processing (excluding data prep) should be guaranteed, they say, but future growth should be taken up by private companies. State employees would get the advantage of technology transfer from the private sector, and the country as a whole would gain.

There needs to be some demonstration that services to the taxpayer would improve because taxes went on private rather than public spending. Despite Tory philosophy, it doesn't necessarily follow.

Where the CSA has hit the nail on the head is in its call for less secrecy on the bidding for potential contracts, on how they were awarded, on the price of the winning bid, and on completion dates. That information is not available.

It is in everyone's interest to see the facts behind the decisions on where government spending on computer services goes. Apart from the equity of such a procedure, it would follow a path well trodden by other governments which are more open - notably the US. And it is something on which trade unions, government data processing management and the CSA could unite.

1984 and all that...

THIS week's example of the strange things people say about computers was sent in by E. L. Smith of Blackburn, Lancs, who was 25.

Chief Inspector Alan Richardson, in charge of the welfare department at Lancashire Police Headquarters at Hutton, said: "The computer doesn't react after 99. I think that is the general case with computers. So they have to be one year old."

Lancashire Evening Telegraph

Lancashire Evening Telegraph

Lancashire Evening Telegraph

Lancashire Evening Telegraph

Lancashire Evening Telegraph

## LETTERS

### Cobol revision pros and cons

I REFER to the two articles concerning the proposed Cobol revision by Philip Brown and Alan Morrison (CW, November 5, 1981).

The article by Philip Brown had as its theme "although there are many changes, this should not give rise to many problems. This is in my opinion not true. I think they will give rise to problems in the following three areas:

a) Financial. The conversion of existing programs to conform to the new standard will cost money both in manpower and in machine time. The extent and number of changes will affect this, although not so greatly.

b) Company risks. However much converted programs are carefully tested, it cannot always be 100% certain that they will execute in the same way as the old versions.

c) Delay. Conversion and testing will require time, that could otherwise be spent on improving existing programs or creating new ones.

Conversely, the article by Alan Morrison carried the theme "the disadvantages of the changes are by definition greater than the advantages; therefore, let's not change."

This standpoint strikes me as much too rigid. Changes will often bring disadvantages with them, but that in itself may not be the sole criterion for making the decision to change. I personally try to assess the changes with the following criteria:

a) The change must be required because it covers an existing feature which has become totally obsolete; or a new feature related to new hardware and/or software; or a change in a feature that attains a

considerable improvement over the existing capabilities.

b) Modifications to existing programs due to the particular change should be minimised. One of the ways this can be achieved is through the retention of an existing feature as a transitional item (T-item), i.e. an item that will disappear in a following revision of Cobol.

In my opinion more items that appear in the proposed revision could be so considered.

Alan Morrison names two further specific objections:

1. "The omission of any Database Management System (DBMS) facilities." I can entirely agree with this. The Netherlands Cobol Committee has strongly urged ANSI to take up DBMS facilities in the next revision, or to announce a DBMS addendum.

2. "The (minimum) subset is virtually worthless to the user." He then cites examples of features that are not part of the proposed minimum Cobol, but are included in the high levels.

If we consider the low levels of the present Cobol standard also as minimum Cobol, then the following points emerge:

a. COMPUTE, SEARCH, SEARCH ALL, STRING and UNSTRING are not in the proposed minimum Cobol. Neither are they in the present minimum Cobol.

b. EVALUATE and INITIALIZE (new statements) are not in the proposed minimum Cobol. I agree that INITIALIZE should be included in minimum Cobol. EVALUATE, however, should not be included because of its complexity.

c. INSPECT, currently in

minimum Cobol, is not in the proposed minimum Cobol. I agree that INSPECT should remain.

d. In the proposed minimum Cobol there is no Relative O or Indexed O. Neither are they in the current minimum Cobol.

It must not be forgotten that extensions can always be permitted. For example, manufacturers of microcomputers with floppy discs may decide to include partial or complete Indexed I/O in their Cobol compilers.

In conclusion, I think that the proposed Cobol revision contains such well-qualified elements that the negative points cannot outweigh the give that proposed Cobol revision a positive vote.

I would stress that this represents my personal view only, and should not be taken as an indication of how the Netherlands will eventually vote.

WIM EBBINKHUIJSEN  
Chairman  
Netherlands Cobol Committee.

IF an "... ELSE DO NOTHING" construct is required for a Cobol statement, what's wrong with "... ELSE NEXT SENTENCE"?

Personally, I'd like to see "PERFORM... DEPEND-ING" and even "CALL... DEPEND-ING" options implemented.

Perhaps there would be a case for the compiler's ignoring everything in square brackets [ ], say, thereby encouraging the use of comments.

CHAZ CONLON  
Cumbria.

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## Tragically under-used

PROGRAMMERS Page (CW, February 25) makes a plea for a DO NOTHING statement. Algol 68 offers such a facility, the SKIP clause. This is used in contexts such as

IF condition 1  
THEN  
action 1;  
IF condition 2  
THEN  
SKIP (do nothing)  
ELSE  
action 2

or frequently, in loops:  
WHILE (serial clause, that is, a series of "statements" which eventually ends up delivering a result which is TRUE or FALSE and therefore determines repetition of the loop body and of this serial clause);  
action 1;  
dependent action 2;  
condition depending on outcome of 1 and 2  
DO  
SKIP

whereby we indicate once again that Algol 68 is a tragically under-used advance over its contemporary and more recent competitors in the field of procedural programming languages.

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Leeds LS16 7DB.

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## Computer room replaces golf-club

NON-GOLFING DPMs are probably now in the depths of despondency at Alan Simpson's suggestion that patronage of the golf club is more significant than a successful work record in the career stakes (Focus, CW, February 18).

Perhaps, however, a means of competing with their low-handicap brethren is to be found elsewhere in Mr Simpson's article. He speaks in disparaging terms of computer room "visits"; but surely these are the very opportunities for the less sporty DPM to make those casual,

high-level, intimacy-exchanging contacts afforded by the golf club.

Simply convert the tape library into the 19th hole, and get to know the chairman in the chimney way that can otherwise only be achieved in the togetherness of the bunker.

More seriously, computer room visits may be unwelcome, but they are an inevitable fact of DP management life. They also underline the need to have effective control of access which includes intrusion monitoring - i.e. a selective alarm system that will indicate to the

shift leader that a visitor (rather than an authorised member of the computer staff) has entered, and will tell him when the caller leaves.

It is more sensible and less disruptive for DPMs to equip the computer room properly to deal with visitors, rather than curse that visits should have to be allowed.

COMMANDER R. N. D. PORTER  
Managing director  
Masstiff Security Systems Ltd  
Leatherhead, Surrey.

## ME29 financial package exists now

FURTHER to Claire Gooding's article ME29 Users will get GL/Plus Financial Management System (CW, February 18), I should point out the following:

Package Programs Ltd (PPL) has had an ICL ME29 version of the MMS General Ledger and Financial Reporting System available for the past year. The first

installation was in February 1981 at Connaught Laboratories in Toronto, Canada and since then we have sold the system to a number of companies in the UK, including Bostik, Lombard Insurance, Bishops Stores and Kwik-fit Euro, as well as to companies in Hong Kong, Australia and South Africa.

The first ICL version of the

MMS General Ledger from Software International was developed and installed by PPL in 1974 and we currently have over 45 ICL installations in the UK, plus more than 40 overseas.

IAN PARKER  
Managing director  
PPL-MMS Ltd  
London, SE1.

## Liveware File

OK - NOW I'VE BEEN ROUND THE BARBICAN...

...TAKE ME TO THE TICKET OFFICE...

I BELIEVE IT'S COMPUTER-BASED...

...IT'S THE ONE PLACE I'LL GET AN ANTI-STATIC MAT!

by Don

by Don

by Don

## The TOTAL Answer

Hamilton

No 1

for rent or sale of terminals

Hamilton Rentals Limited  
Hamilton House North Circular Road London NW10 7UB  
London 01-861 6777  
Birmingham 021-236 3561  
Manchester 061-848 8338/8434

Central Scotland 0501 43182  
Aberdeen 0224-25301

Central Scotland 0501 43182  
Aberdeen 0224-25301

Central Scotland 0501 43182  
Aberdeen 0224-25301



A book to be published next month, listing available contractors has angered the agencies . . . This week we ask why

## Agencies upset over direct recruitment bid

AN attack is being made on the agencies which so far have dominated the contract programming market. It comes in the form of a directory, which will publish the names, addresses and career details of people who at the time of publishing were available for contract.

Interested companies would take out a subscription for the directory, approach potential contractors, arrange interviews, and negotiate terms directly — thereby eliminating the agency's cut, which is typically 25 to 30 per cent of the company's fee. This could be shared between the contractor and the company.

At least this is what the directory's publisher, London-based DP Recruitment Ltd (DPRL), would have us believe. The ques-

tion is, will it work? Will it force a co-existence with the agencies? Or will the agencies quickly be forgotten when companies fail to take out subscriptions?

The answer depends directly on the response from interested companies, and indirectly on contractors sending in their CVs. Since the latter have only the cost of a stamp to lose, that would seem to cause no problems.

Yet the first advertisement for the directory, called NCCD, for National Computer Contract Directory, was pitched at the contractor.

DPRL was aiming to have details of 1,500 contractors in the first edition of the directory, due for publication in April.

In fact, DPRL has done better than this. "Already we have had



NORRIS (left) and NICHOLLS of Computastaff . . . Sceptical that companies will take on the donkey work

2,164 replies to our initial advertisement," says Thomas Kaye, a director of DPRL, who adds that at this rate he will have every contractor in Britain on his books by Easter.

The contractor may have nothing to lose by submitting a CV to the directory, but what of companies used to letting an agent find them suitable temporary staff?

They will not be so keen, say the agencies. There will be more work involved in finding the right

people, and maybe no actual savings at all. "What most systems managers want is to be given the CVs of just a few suitable contractors who really want the job," says Alan Norris, chairman of London-based recruitment agency Computastaff.

Norris points out that a company setting out to hire contractors from the directory would probably have to make dozens of phone calls to people who have already found work, or who just don't just want the particular job. In other words, the donkey work usually done by the agency itself.

Another large agency, KPG Computer Support, with offices in a converted cottage in Richmond, believes that most companies value a personal service too much to risk taking people from a directory. "We make more effort interviewing prospective contractors than our competitors," claims KPG managing director Brian White.

KPG's manager of systems programming, Frank Swift, who was hired partly to implement this "stiff interview" policy, makes the same point more strongly. "Some big and small agencies are no more than photocopying units," he snarls, while declining to name names.

Of the agencies Computer Weekly spoke to, only the London-based VLI Group said it might consider offering a rival service. "We are watching the contractors directory scene

closely," says VLI marketing director Anthony Lambie.

The first advertisement for NCCD in Computer Weekly, February 18, angered some of the agencies. They felt it gave the false impression that contractors who establish limited companies and still find work through agencies will have 30% of their income deducted from April 1982.

The offending sentence was: "It now appears certain that, from April 5, 1982, those contracting companies who find work through agencies, will have 30% of their income deducted."

The Treasury has made it clear that no such legislation will take effect this April. There may be legislation in the future, but probably not before next year.

Kaye defends the wording saying that it was merely meant to warn people of possible legislation some time this year, and not to create a sudden panic.

Yet there is at least one contractor who claims to have replied to the advertisement through fear of possible tax changes.

Keith Rolley went contract as an analyst last year, working for an agency called Span. "I was worried at the possible loss of 30% because of the cash flow problems it would cause," he says. "I just couldn't afford to lose that money."

A contractor who put details up to NCCD for a different reason is Andrew Ballantine, a specialist in PDP operating systems. "I think the directory is a good idea because the agencies take too much of the cake," he says.

But Ballantine's main reason for wanting to be listed in the directory is the free publicity. "Work has been thin on the ground because not enough people know about me," he laments.

Whether many companies will take the directory remains to be seen, but Kaye claims that DPRL has already heard from many interested firms.

"There will continue to be a place for those agencies who provide a valid service and we aim only at companies who want to take on staff from a directory," he says.

It is a pity that the directory's inaugural advertisement should, for all its gloss, contain a few slips of the pen.

One glaring error was the omission from the contractor's application form of a request for one vital piece of information — the telephone number.

## Why software testing is lagging behind

IT is possibly an inevitable consequence of human nature that software testing is the least advanced branch of system development.

Since most analysts would agree that testing consumes half of total development time, why else is it lagging behind? Certainly not through a lack of techniques.

In theory, any program can be proved mathematically correct by analysing every possible pathway, although this is not practical for large interactive systems. But a number of common sense methods can be applied to simplify testing and minimise the risk of embarrassing bugs being exposed at a late stage when their elimination is more costly.

Common recommendations include liberal printout of intermediate results of program execution at the development stage, constant check of outputs from standard test sets, and the searching examination of boundary values.

So-called "off by one errors" are a constant source of crashes, and are not always easy to find.

But a slightly more contentious recommendation is making the testers independent of the designers and coders.

It is human nature not to spot one's own mistakes, but employ-

ing an independent testing team is expensive and often counter-productive.

In an ideal world, all code would be read by someone who has been involved with the project, but not with the code itself, or by someone independent of the whole project.

But as for the overall test, I feel there is not always a need for a special testing group. So long as established techniques are religiously applied, it can be carried out well enough by the development team.

Their intricate knowledge of the code can be a bonus as well as a hindrance.

## PUZZLER

PPP  
PP x  
PPPP  
PPPP  
PPPP

ALL 18 numbers in this multiplication sum are Prime (2, 3, 5, 7). Can you work out the individual identities? See page 47 for solution.

Increased performance and cost-cuts could soon make night and weekend jobs a thing of the past

## Operators face a shift to 9-to-5 working

ONCE upon a time, machines were very expensive and to recoup the enormous capital outlay companies running computers were obliged to get the most out of them. This meant keeping the beasts running long after all self-respecting people had gone home.

All through the night they ran, tirelessly crunching numbers as their masters slept. But someone was required to watch over them at all times.

And so it was that computer operators came into being, to ensure that all went well in the small hours. Because of the unsocial hours additional remuneration was offered, in the form of shift allowances.

These allowances raised salaries to the point where operating became one of the highest paid jobs in the industry, with excellent prospects for promotion and career advancement.

Second and third generation computers were not only expensive, but required constant engineering attention if they were to be kept running. Twenty-four hours, seven days a week cover could be provided by the manufacturers at a price which appeared low in comparison with the cost of the hardware.

But massive reductions in the cost of hardware in recent times has meant that the need to bring every last ounce of performance out of computers has reduced dramatically.

Suddenly, computer users are realising that with the increased performance and reduced capital outlay, today's machines do not have to be run all day and every day. The time is fast approaching when cheap, powerful machines will be run only between nine and five. Evening, night, and weekend working will become a thing of the past.

A senior field engineer told me this week that the number of sites serviced on a three-shift basis is rapidly declining, and that two-shift engineering cover is also be-

coming rarer. The trend now is for prime shift cover only, without even the benefit of telephone standby at other times.

To illustrate his point he told me that his company's small mainframe was now priced to be competitive with the additional charge for evening, night and weekend cover. In other words, it is cheaper for an installation with one of these machines to buy another and to forgo running two or three shifts and providing engineering cover for them.

This has an obvious and significant effect on operations staff. Running two machines on one shift does not require double the number of operators, as does two-shift working on a single processor. If there are currently two or three shifts employed, and the management brings in another processor, someone will become redundant.

Checking within ICL revealed a definite trend towards prime shift-only working, as reflected by its maintenance contracts with customer sites. A spokesman said that, at present, the change is apparent at the smaller end of the market, among the System 25s and similar hardware.

ICL is encouraging customers to buy more hardware and less support. The company now offers engineering cover on a two days a week basis, which both ICL and its customers consider a step in the right direction.

Although it is the small systems which are showing the trend at the moment, it can only be a matter of time before large mainframes are affected.

I would be interested to hear from those whose site has changed, or is in the process of changing, its shift system. Perhaps overtime is more infrequent now or engineering cover is not available at weekends. Perhaps that new processor doesn't mean extra work or job security.

Look out for the signs of approaching loss of shift allowance — or even your job.

## 'Everybody out' when new boss arrived

by Andrew Thomas  
A CERTAIN British computer manufacturer decided that it was time to inject some new blood into its customer engineering division, and obtained the services of a customer services manager from a very large American computer manufacturer.

Here was a man with experience of field engineering in the white heat of transatlantic technical know-how. If anyone could inject some dynamism into the UK engineers, this was the man.

Unfortunately, the initial impression created by the new chief engineer proved to be somewhat less impressive than his employers might have hoped.

On the tour of his new empire to inspect the troops, he burst dynamically into an engineers' room at a major site. In a room with accommodation for eight engineers, he found but one, quietly catching up with a large pile of fault reports.

"Where the hell is everyone? Why aren't they in here working?" demanded the expert from over the pond.

"They're all out at customer sites working," they only come in

here when there's nothing to do," replied the puzzled engineer.

"Ah, silly of me," said the manager sheepishly. "I'm used to an office environment where people not being at their desks means no work's being done."

"I see," replied the engineer condescendingly, wondering just how much knowledge of field engineering his new master actually possessed.

The engineer's thoughts were given more food by the announcement some days later of monthly meetings involving all field engineers being called in to a central location to discuss any problems encountered, and to find solutions to them.

A laudable aim it would seem, but at least one engineer could take some soling, given the present incumbent of the management position.

"How am I going to explain to a customer that I can't fix his machine because I've got to go to a staff meeting?"

Perhaps operations managers will be investing in chains and padlocks to ensure that, once they get an engineer on site, they can keep him there.

by Andrew Thomas

## Give all programs a jobname

by Colin O'Keefe  
IBM-compatible machines must meet very tight constraints before they are acceptable on the open market. For example, machines of the System 370 class must be fully compatible in all areas of operation, except for three types of program: Model-dependent programs; time-dependent programs; and programs which cause deliberate machine checks.

While the first two are unlikely to concern an operator, the third type is often written as part of a maintenance suite, and would therefore be under the jurisdiction of the operator in charge.

This suite could easily be run on new hardware for which it was not designed, and could as a result produce a meaningless output.

To prevent this, it would be a good idea to give all programs designed for a specific model number a jobname containing that number, so that when a new machine is installed, maintenance suites can be updated accordingly.



Will operators' chairs soon be occupied only during the day shift?



## The Specialist Event for Specialist Computer Purchasers

Peripherals '82 will feature the very latest in terminals, VDUs, printers, plotters, memory products, graphic displays, tape and disc drives — an exhibition for anyone with purchasing responsibility in the computer peripherals field. This professional exhibition — presented by the **Peripherals Suppliers Association** and Systems International — is the annual opportunity for those requiring computer peripherals to discuss their needs with specialist suppliers.

**March 31 — April 2, 1982**  
**10.00 — 17.30 (closing at 16.00 on the last day)**  
**West Centre Hotel, Lillie Road, London SW6**

Admission, by business registration, is free of charge. Plan your visit now and save time on arrival by sending for your registration leaflet in advance.

Please send ..... copy/copies of the Peripherals '82 visitor registration leaflet(s) to:

Name .....  
Company .....  
Address .....

Post to: The Exhibition Manager, Peripherals '82, IPC Exhibitions Ltd., Surrey House, 1 Throley Way, Sutton, Surrey SM1 4QQ.







Graphics has become an essential tool for those controlling company finance . . . David Casey reports

# A good picture is worth a thousand words when passing on information

NEWSPAPER journalists are well aware that a good picture is worth a thousand words.

No less important is the information content displayed through a video display - an electronic blackboard which has pervaded every sector of the business community during the past five years. In many corporate finance departments, the screen has replaced the printed page as the first contact with statistical and financial information; a hard copy is extracted from the computer only for longer term reference.

Down on the shop floor, progress is monitored on VDUs, a medium well able to handle production information which is constantly changing.

Systems able to mould raw statistical information into a graphic display are not a new development, however. In the field of computer-aided design, terminals which can interpret arrays of mathematical equations as three-dimensional representations on the screen have helped to simplify complex engineering projects.

Integrated circuit design, a process which evolved from the layout of printed circuit boards, owes much to the interactive capabilities of computer graphics.

Growth in the computer graphics sector will be focused on two market areas during the next five years. The small design team is a prime target for system suppliers currently experiencing resistance to CAD equipment priced at £100,000 or more. Computervision, a company which has dominated European CAD sales since the early 1970s, recently introduced the Designer M series specifically for this smaller scale user.

A feature now available on the Computervision systems is three-dimensional "solid modelling", in

which the 3D framework normally associated with CAD graphics is replaced by a more realistic representation.

With trends in management towards the greater disclosure of information computer graphics will help provide an interface between contrasting disciplines. From their professional training, the account-

**With trends in management towards the greater disclosure of information, computer graphics will help provide an interface between contrasting disciplines**

ants in an organisation are able to gauge a company's performance using only a handful of key financial statistics.

Communicating the same information to technical personnel or trades union representatives requires a very different approach: no less thorough, but with the data presented in a more palatable form.

If employed only as a medium for translating data from narrative to a pictorial form, "computer graphics" systems are a one-directional channel of communication. The flow of information is from the computer to the observer, with little opportunity for interaction between the two.

There is an increasing range of applications where the graphics must respond rapidly to changes in the data being displayed. Corporate financial modelling is an

example of how computer graphics can add an extra dimension to a conventional planning technique in that the effect of proposed changes in a strategy may be monitored with the maximum visual impact.

From raw data entered through a series of prompt statements, a static model of a company is developed as the first step. The critical factor, cash flow, is budgeted for future trading periods; the timescale of the forecast being determined by the availability of accurate information.

The model of the company which evolves is expressed as successive columns of data representing weekly or monthly cash movements. At best, the table is a projection of a business based on a single set of inputs.

Modifying any of the key parameters of the business on a "what if?" basis generates a revised model which may differ from the first approximation in only a few of the component figures: the impact of these variations may be apparent only to the trained financial eye. Interpreting the same models on a graphics display terminal will highlight changes for management whose role it is to appreciate corporate performance without having to understand the accounting principles involved.

By basing hardware design on conventional terminals wherever possible, manufacturers have been able to bring full graphics capabilities within the scope of the smaller business market. On its HP125 Business Assistant, Hewlett-Packard has introduced colour graphics as a standard feature. Controlled through menus of options, the Graphics/125 software interacts with other packages - including word processing and Basic - running on the same system.

Since the interactive financial modelling system Visicalc is also supported by the HP125, it follows that trial models of a company can be converted into pie charts, several types of bar chart, or conventional X-Y graphs. Outputting the contents of the screen to a multi-colour plotter produces either a hard copy on paper, or a transparency for overhead projection.

With the enormous potential of its minicomputer user base to be tapped (there are an estimated 12,000 PDP-11 systems in the UK alone), Digital Equipment has introduced a range of graphics terminals. The VT125, for example, is a model in the VT100 series, which supports DEC's Remote Graphics Instruction Set (REGIS). But the specialised graphics software for the VT125 can be used to upgrade an existing VT100 terminal, providing a relatively low-cost introduction to the technique.

Designed primarily for the educational and smaller business markets, the GIGI graphics terminal from DEC uses the same REGIS software as the VT125, and supports a version of Basic for manipulating graphic symbols on the display. For integrating text with graphics, the DEC-RTB package on the system provides text input and editing facilities.

Aiming at a similar user base the DEC VT125 produces a Data General's Dasher D280C colour terminal. Compatible with the manufacturer's D100 and D200 terminals, the colour unit would be used in business applications where the creation of multi-coloured charts could improve communications.

The isolation of business graphics as a definable market sector is accounting for an increasing share of the turnover of suppliers normally associated with engineering



The effect of proposed changes in company strategy may be monitored with relative ease.

design systems. Calcomp is currently placing 30% of its small plotters in commercial applications as diverse as market research (National Opinion Polls), strategic planning (Gallahers) and commodity broking.

The introduction of microcomputers with an inherent graphics capability will do much to promote sales of the cheaper graphics plotters. Calcomp software has been

**The more familiar that a businessman becomes with the applications of the technique, the greater is the likelihood that he will find a need for more sophisticated systems**

modified for Apples, for example, with output to a colour plotter. Neil McLeod, the company marketing services manager believes that the "economy" micro provides a valuable, if somewhat restricted, introduction to computer graphics. "The more familiar that a businessman becomes with the applications of the technique, the greater is the likelihood that he will find a need for a more sophisticated system."

McLeod does not see a major market arising however, from the development of networks for micros. "The benefit of having a graphics output device linked to your own terminal is lost if the unit is at a remote point in the network."

While the development of business graphics systems owes much to the work of the CAD manufacturers, the lead in this field has been taken more recently by purpose-built display units. The Comshare Execuchart is a unit designed specifically for the commercial market with the presumption that the user will have little knowledge of computer systems. Able to operate in six graphic modes, the standalone terminal is supplied with a library of charts as an aid to designing meaningful displays. Interaction between the operator and the system is improved using an electronic "mouse" on a desk-top screen. This device, rather than a conventional cursor control pad, selects options from menus of commands which appear on the display.

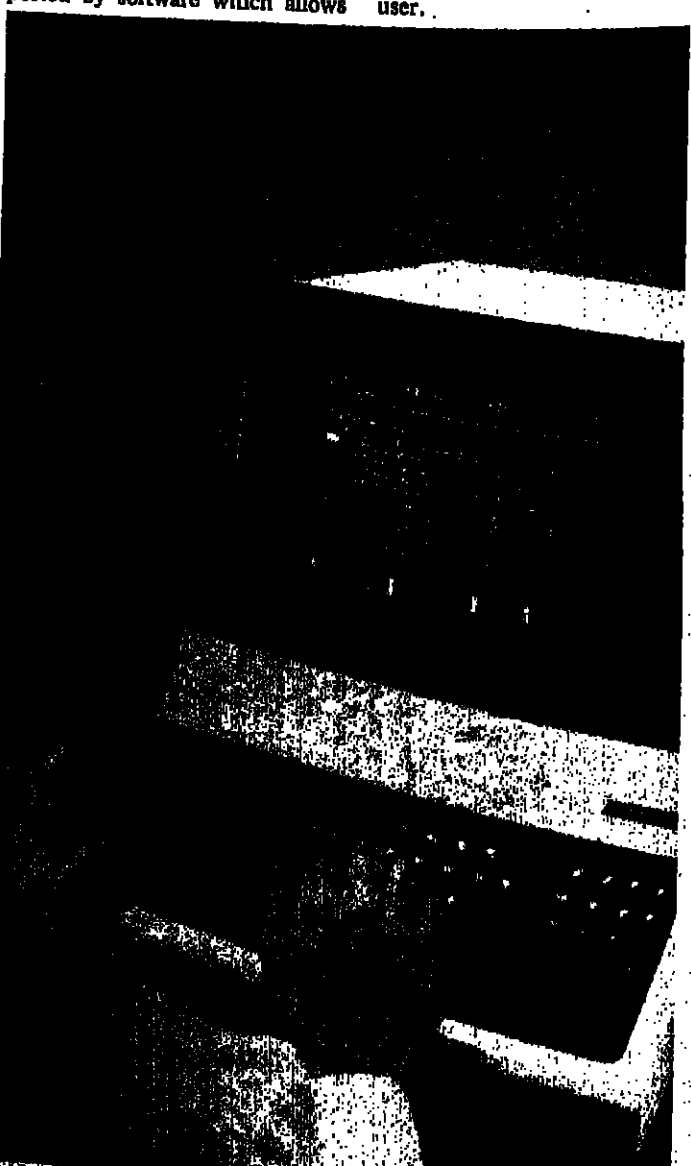
The concept of a free-moving "mouse" on a control surface is also applied by Xerox on the 8010 Star information system, designed as an executive workstation. A Star unit provides a high definition black and white representation of both text and graphics; simulating a printed A4 page.

In the Perq workstation being manufactured and marketed by ICL, a hand-held input control - not dissimilar to the Xerox "mouse" - has replaced the single function graphics pen with which the system was first launched. A single Perq installation is based on a 16-bit CPU with between one-quarter and 1 Mbyte of memory and a 24 Mbyte Winchester.

The standard to which information can be presented on the screen is exceptionally high, and is supported by software which allows

rapid manipulation of charts and diagrams within a document. Using a raster screen refreshing at 60 Hz, Perq can support realistic animation. The system's ability to treat defined areas of the screen as separate display "windows" would allow a financial planning package to be run through one of these zones with the graphic results displayed simultaneously elsewhere on the screen. As part of a network of executive terminals, the ICL system is able to communicate directly with other Perq units, transmitting both conventional text and graphics.

With the Comshare Execuchart and Xerox Star, Perq is indicative of the movement in the computing market towards products designed specifically to meet the graphics requirements of the management user.



DEC's GIGI graphics terminal for the smaller business markets.

Bob Brash compares graphics printers and vector plotters, and looks at some different methods of interfacing them

# How to pick the best hard copy method

NO computer graphics system is complete without a plotter. In the same way that a conventional business computer system needs a printer, even for occasional use only, some form of hard copy is needed for graphics images because it is unlikely that terminals will be located wherever reference has to be made to a diagram.

There are basically two distinct ways of producing a graphics display. These are raster and vector. This distinction applies both to visual display units and hard copy units.

For a visual display system the raster output is the most common since most displays have a continuous refresh system. The alternative is a storage tube type of display on which vectors are written and retained by the storage tube memory.

Whichever display is used, the data is originally generated in vector form. However, in the case of a raster display it is written into a memory which is then scanned in raster fashion in sync with the line scan of the cathode ray tube.

Directly analogous to the raster and storage tube CRTs used for visual display are the printer and XY plotter used for hard copy output. A printer is able to take an input from the raster scan memory and reproduce it by scanning the paper and placing dots in the appropriate places to build up a vector pattern. In the case of an XY plotter information is sent in its original form and this is translated into a controlled motion of the pen to produce the required vector on the paper. It is therefore possible to build up a complete graphics picture without having a raster scan type of memory (usually referred to as a bit map memory) to hold each resolution point within the picture area. This is quite important when dealing with high resolution displays, where the amount of memory required for such a bit map becomes very large.

When comparing printer and vector plotters, it is difficult to say that one is better than the other; each has its place for certain applications. As a general rule, one would choose a vector plotter where quality of presentation and accuracy are the most important features and a printer/plotter where speed of output is most important, particularly if there is a lot of alphanumeric data to be recorded within the graphics plot. One would also use a vector plotter in cases where a large scale plot is required.

There are two basic types of vector plotter. First is the flat bed plotter which has a pen or series of pens mounted on a carriage which is mounted on a moving platen such that the pen may be moved in two directions over a flat bed. This has the advantage that the whole of the plotting area is visible during the plot and may be observed without removing the paper. Data may be added to the same sheet.

The second type is the drum plotter which is used particularly for very large scale plotting where the sheer size of a flat bed plotter would be undecidable. In this system the paper is moved in one direction by means of a revolving drum and the pen is moved in the other direction. Vector plotters range in size from A4 size (28 cm high) up to A0 size and beyond (120 cm high).

In either of these types of vector plotter the pen, gantry or paper may be moved either by stepper motors or by analogue DC motors. In each case data is processed digitally in digital form and presented to the motor drive electronics. In the case of the stepper motor these commands are processed digitally and step by step commands are given to the motor.

When a computer converses with an XY plotter, commands are sent to a vector plotter in exactly the same way as one would send a string of characters to a printer; that is using a standard ASCII character set. In order to be able to interpret the characters presented to it a command language is required in which each action or operation of the plotter has a unique command format. Unfortunately, no standard language for vector plotters has yet emerged and today almost every

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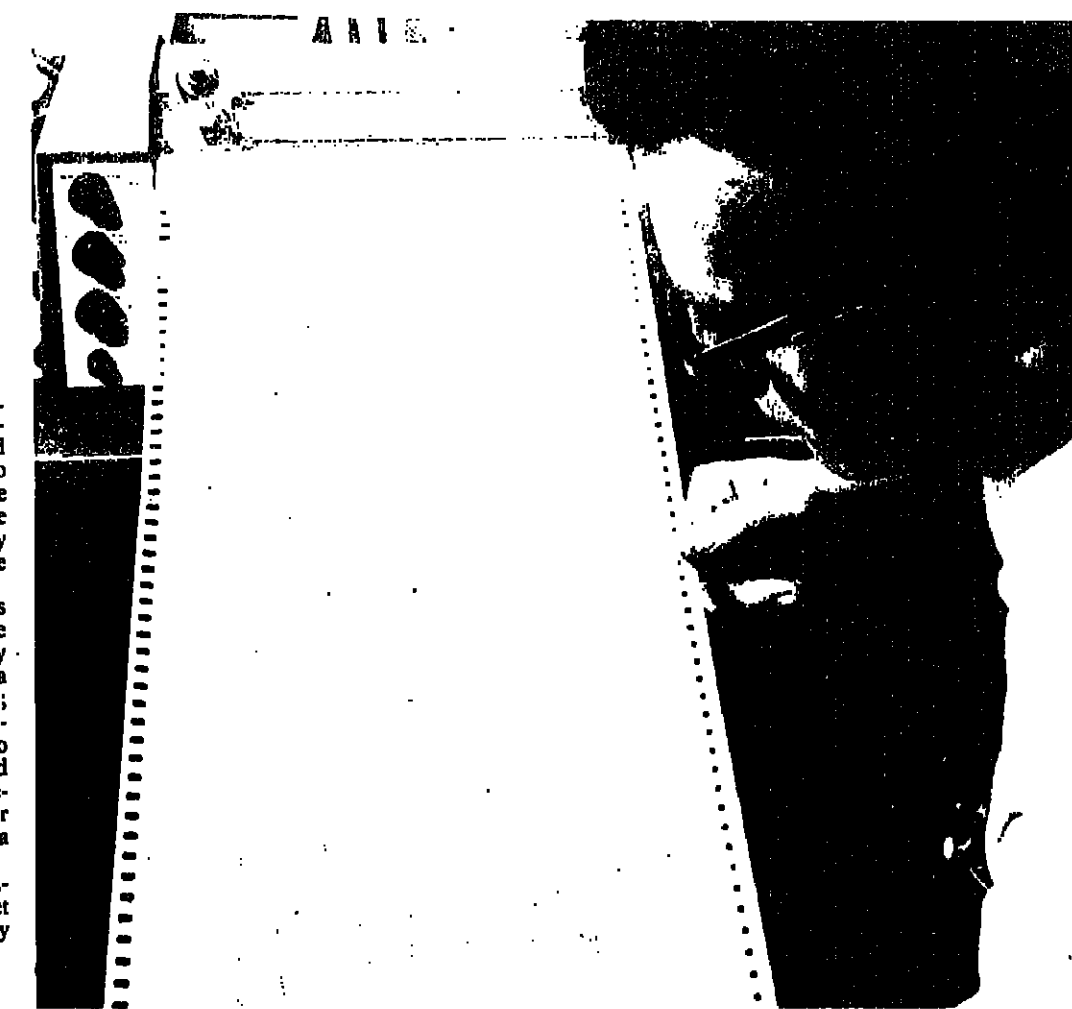
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**Unfortunately no standard language for vector plotters has yet emerged and today almost every plotter on the market has its own different command structure**

plotter on the market has its own different command structure. This means that software has to be written for a particular plotter and alterations would generally have to be made to enable it to run on any other plotter, or at least a plotter from another manufacturer.

In addition to the drawing commands a number of other commands are available on most plotters for functions such as scaling, automatic pen changing, automatic advance of the paper where the unit has a chart advance attachment, in-built error checking facilities, and digitising. The digitising function is an interesting and useful function and one not available on printer plotters.

By means of the digitising controller one is able to move the plotting surface manually, and to transmit the co-ordinates of any selected point from the vector plotter back to the computer. This has a variety



A vector plotter would be chosen where quality of presentation and accuracy are the most important features.

of uses - for alignment of the paper, for specifying a plotting window which is smaller than the overall plotting area of the plotter, and for identifying a location on the plot, for example where the plotter has previously drawn a map it can identify a particular location and supply the co-ordinates of that location to the computer.

The scaling facility is another important feature which allows the user to redefine the plotting units. The two most common interfaces used are the RS232 and the IEEE. Nearly all graphics plotters are compatible with one or the other or both these interfaces.

The RS232 is a long established interface used particularly to connect printers and mass storage devices to computers. With the RS232 interface, data is transmitted bit serially and this has the effect of minimising the number of interconnecting wires involved. Data is transmitted at one of several defined bit or baud rates along a single line and similarly received along a second line. These two lines are called the TD and RD lines.

In the simplest configuration it is only necessary to use three wires TD, RD and Ground to connect a plotter to a computer via the RS232 interface. Having made

these connections and provided that the transmission rates are matched between the computer and the plotter, and that some other options are compatible such as word length and parity bits, it will be possible to transmit data from the computer to the vector plotter and similarly when using a digitised function to transmit data from the plotter to the computer.

Provided that the vector plotter has an instruction buffer and the size of the buffer is adequate to

accommodate the largest plot required, then the three connections are all that is required to operate the system satisfactorily. The IEEE-488 or IEC625 interface is a bit parallel byte serial interface invented in 1975 by Hewlett Packard. It is used particularly in the instrumentation field where a number of instruments are required to exchange data between themselves, and a particular feature of it is that a number of instruments may be connected in

	Graphics Printers	Vector Plotters
Type of paper	Roll	Sheet
Speed (characters)	Fast	Slow
Speed (vectors)	Slow	Fast
Line quality	Poor	Good
Resolution (typical)	0.25 mm	0.1 mm
Multiple copies	Some	No
Number of colours (typical)	1	6
Digitising	No	Yes
Price (typical)	£1,500	£2,500

Printers v. plotters

parallel on the same bus system. Every system must have a controller and only one controller may be in charge of the flow of data at a given time; usually the bus controller is a computer.

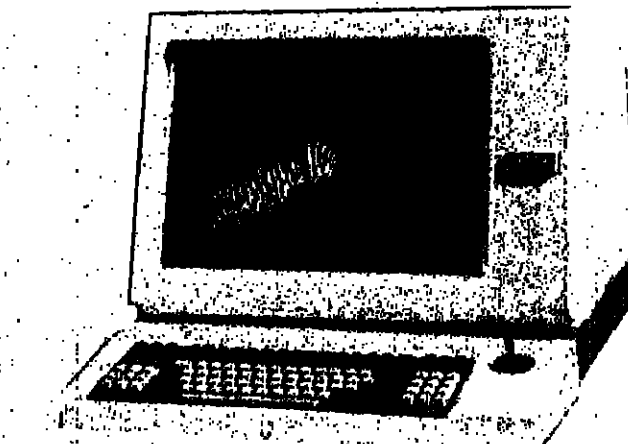
With this interface each of the peripherals on the bus is given a different bus address and is told when to talk and when to listen by the bus controller.

The IEEE specification and the IEC specification are electrically identical but the specification of the interconnecting plugs and sockets are, unfortunately, different.

In comparing the two interfaces one can say that the IEEE interface is generally faster than the RS232 and requires less setting up, the only adjustment possible being selection of the bus address. It does, however, require many more interconnecting lines than the RS232 interface and has a limit on the maximum length of cable over which it will operate of about 20 metres.

Bob Brash is research and development director with Bryans Southern Instruments.

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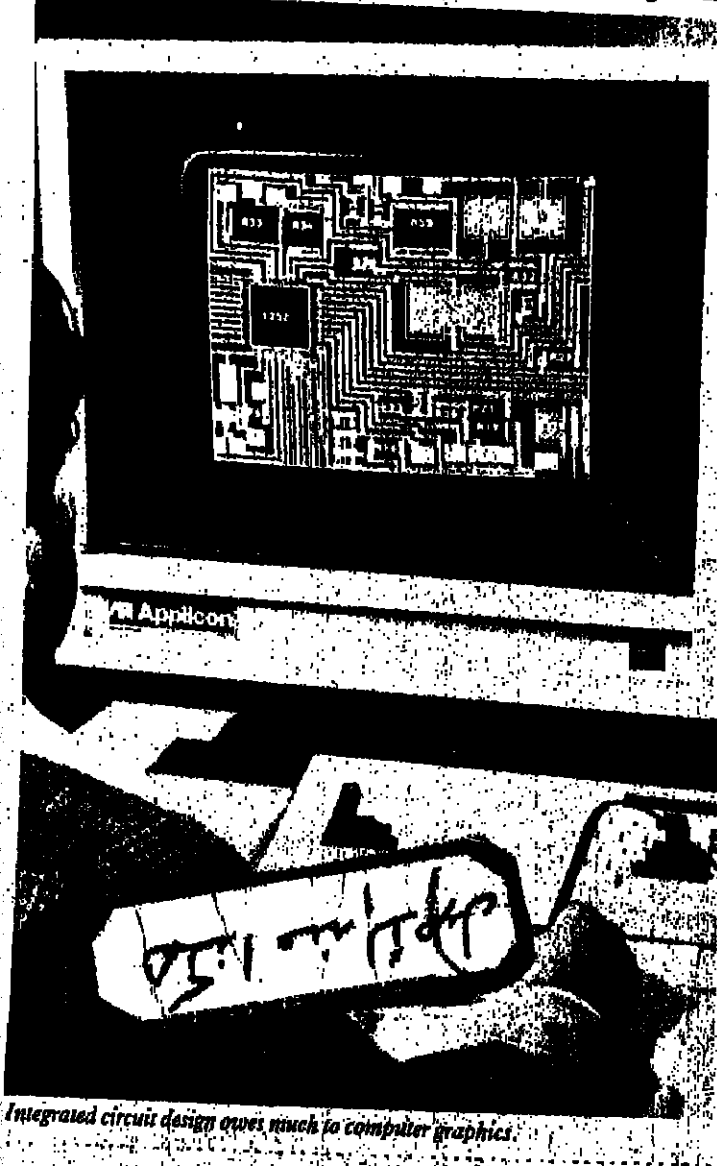
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This is a printer/plotter where speed of output is the key.



Integrated circuit design owes much to computer graphics.









Memorex's 2051 display station.

## Display unit for IBM

THE 2051 Display Station, announced by Memorex, is a plug-compatible replacement for the IBM 5251 Model 11 Display Station, for use with IBM System/34 and System/38 CPUs.

The 2051, the first Memorex product developed specifically for this fast-growing market, attaches directly to the CPUs or through the IBM 5251 Model 12 Remote Cluster Controller.

## Graphics station designed with the operator in mind

A GRAPHICS workstation, the 2019W is announced by Westward Micro Systems, UK computer graphics manufacturing specialists, which has set up its own in-house marketing department selling direct to systems houses and end-users. Previously it has sold through a distributor.

Designed and manufactured to suit a wide range of users and environments, the 2019W is a workstation aimed at sophisticated CAD or graphics application needs.

A major feature of the 2019W is its ergonomic design, including a desk-top display unit which is adjustable for position, viewing distance, screen angle and tilt. "Users who spend prolonged periods at a screen have long been neglected," said marketing director David Lade. "We believe manufacturers must provide a full range of adjustments for operator comfort."

The workstation has an enlarged display screen with a 19in tube.

The anti-reflective green phosphor tube with bonded face plate combined with advanced raster technology provides exceptional clarity and stability of display whatever the lighting conditions. A colour-coded detachable keyboard allows the user to work with complete freedom, says Lade.

Software compatible with the Tektronix 4014 terminal, the 2019W gives a 1024 x 784 pixel resolution and can be used with Gino, Plot 10 and many other proprietary software packages.

Options include plain paper or electrostatic copiers, a graphics tablet and four-page VDU buffer allowing high speed scrolling and display "window" for easy text/graphics integration.

The 2019W is priced at under £7,000.

Westward Micro Systems (CW), Alexandra Way, Ashchurch Industrial Estate, Tewkesbury, Gloucestershire GL20 8NB. Tel.: (0684) 298600.



The Ferranti Chinese text processor including VDU keyboard and printer.

## Chinese text system

A CHINESE processing system, which enables the user to input and process Chinese text using a keyboard and a visual display unit has been developed by Ferranti Computer Systems.

The processor incorporates a standard qwerty keyboard with two extra function pads of 8 and 12 keys respectively, inscribed with Chinese characters. These keys give the computer commands such as new paragraph, editing instructions, memories and print.

Text is input via the computer using Chinese phonetics. The software helps the operator to select the correct character from a dictionary of over 8,000, and this becomes the next "word" on the page. The text is stored on floppy disc.

Ferranti Computer Systems (CW), Wythenshawe Division, Simonsway, Wythenshawe, Manchester M22 5LA. Tel: 061-499 3355.

## Low-price printer

WHAT is claimed to be the lowest priced daisy wheel printer on the UK market has been announced by Datarite Terminals. With prices starting at £475, the TPrinter 35 can also be used as a self-correcting electronic typewriter.

Based on the Olivetti Praxis 35 portable electronic typewriter, the TPrinter 35 is supplied with its own ABS-moulded carrying case and weighs 17lbs. It takes up to 12in wide paper and uses standard Olivetti 100 character typewheels. These include a number of characters not usually found on computer printers, such as numerical fractions. The TPrinter 35 can be set for 10, 12 or 15 characters per inch — a feature normally associated with more expensive computer printers and typewriters.

Operating speed under computer control is about 120 words per minute — and completely error-free. The TPrinter 35 is available with Centronics parallel interface at £475, or with RS-232C serial interface at £535.

Datarite Terminals (CW), Calcare House, 144-146 High Road, Chadwell Heath, Essex RM6 6NT. Telephone 01-590 1155.

## Desk-top plotters

DRAFTING quality, space saving and economic pricing are just some of the features claimed for the CPS-16 and CPS-30 Compilot desk-top plotters.

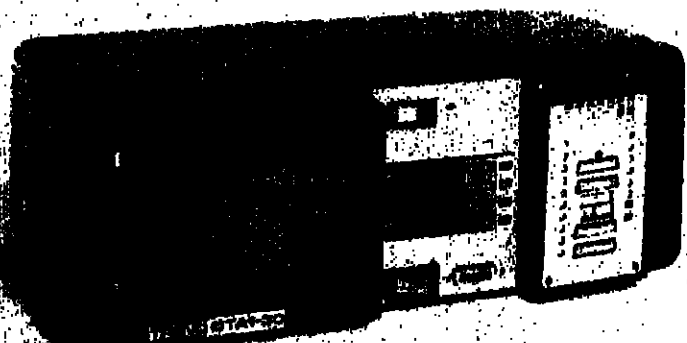
The CPS-16 has a 22in plotting surface, plotting speeds of 10 ips or 15 ips, and four microprocessor controlled pens allowing varied pen width or four colour drawings on paper, Mylar or Velum.

The microprocessor-based controller accepts data from RS 232-C level or 20mA current loop source and provides for automatic detection and rejection of transmission errors, local generation of alphanumeric characters, circular buffer memory and greatly reduced CPU time.

The CPS-16 features illuminated touch control of the pen up/down function, front panel selection of local or remote operation, paper and pen positioning via the jog and slow control, and scaling in both X and Y independently.

The CPS-30, a 22in plotter, offers four different intelligence configurations and five different interface capabilities.

Sinatron Electronics (CW), 14 Arkwright Road, Reading, Berks. Tel: (0734) 85464.



The Trend DTA 1-30 data transmission analyser.

## Trend in data transmission

TREND Communications, the data communications division of Philcom, has developed a microprocessor-controlled data transmission analyser, the Trend DTA 1-30, to meet the needs of manufacturers and users of data communications equipment, of engineers for in-situ fault diagnosis, and of programmers for software debugging and performance analysis.

The portable DTA 1-30 is a bit, block, character and message error rate meter which can be connected as a line monitor or as a high performance analyser simulating a DCE or a DTE.

In simulation mode, the DTA 1-30 will analyse a data channel in terms of signal distortion and error rate. Tests may be performed in simplex, half duplex and full duplex modes using internal or user entered test data or messages.

In monitor mode, half or full duplex data can be displayed on the 7in CRT screen in real time.

Trend Communications (CW), Knaresborough Estate, Loundwater, High Wycombe, Bucks HP10 9QZ. Telephone: (06285) 24977.

## Data General adds four peripherals to commercial family

DATA General has added four peripherals new to the commercial system (CS) computer family. They are a printer, magnetic tape drive, and two Winchester disc sub-systems.

The 4422 microprocessor controlled high-speed printer is a logic-seeking, bi-directional tabletop model. It features a 9 x 9 dot matrix print format, four printer formats (normal, compressed, elongated, and compressed-elongated), four-million-impression ribbon cartridge, and self-test capability. The printer has eight switch-selectable resident languages.

The Magnetic Tape Drive Model 6123 is a back-up device to the L25 and 25 Mbyte discs available on the commercial systems. It features 36 new CS packaged system configurations, thus allowing highly tailored performance and functionality to match the needs of the small business computer user.

Data General (CW), Hounslow House, 724-734 London Road, Hounslow, Middlesex TW3 1PD. Tel: 01-572 7455.

## Drum memory 'faster than a Winchester'

A MOVING head drum memory, which is claimed to beat a Winchester on access speed and throughput and which is smaller and less expensive than comparable fixed head devices, is available from Vermont Research.

Designated the Vermont 6064, the 10.2 Mbyte moving head memory is designed to withstand shock, vibration, temperature extremes and particle contamination.

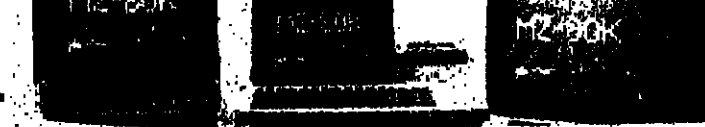
Although developed primarily for Vermont's traditional drum memory markets — telecommunications, process control and scientific research — the company sees potential in other industrial areas. Commercial applications are also envisaged where the 6064 may provide an alternative to Winchester drives, especially in adverse working environments.

Costing about £3,000, the memory logically incorporates 78 cylinders, each with 131 Kbytes capacity, and 16 moving heads, compared with two, four or possibly six heads on competitive devices.

It has a track switch time of 10µs, and single cylinder seek time of 8.3 milliseconds.

The unit is no bigger than two eight-inch floppy disc drives.

Vermont Research (CW), Cleve Road, Leatherhead, Surrey. Tel: (0372) 376221.



Sharp MZ-80K fitted with Daron's Triple-Vision.

## Sharp Triple-Vision

A MULTI-screen microcomputer display system has been introduced by Daron Micro Centre for the Sharp range of personal computers.

For the Sharp MZ-80K and MZ-80B, two monochrome models are available. Triple-Vision provides output to a standard UHF TV or projection TV, plus up to 12 monitors with sound available on the TV.

The Multi-Vision provides sound and vision on up to 12 monitors fitted with audio play-back facilities. Multi-Vision or Triple-Vision are available from Sharp dealers at £35 and £79 respectively, fitting extra.

Daron Micro Centre (CW), 2 Abberdale Road, Sheffield S7 1FD. Tel: (0742) 585490.

## Debt control system

OLIVETTI has extended its range of business computers with the introduction of the BCS 2099, designed to help users exert tight control on overdue debts.

The BCS 2099 is a desktop system which is open to several different computer languages. The unit consists of the central processor, keyboard, 15 inch VDU, console and printer. The system may be expanded to allow up to 12 monitors with sound.

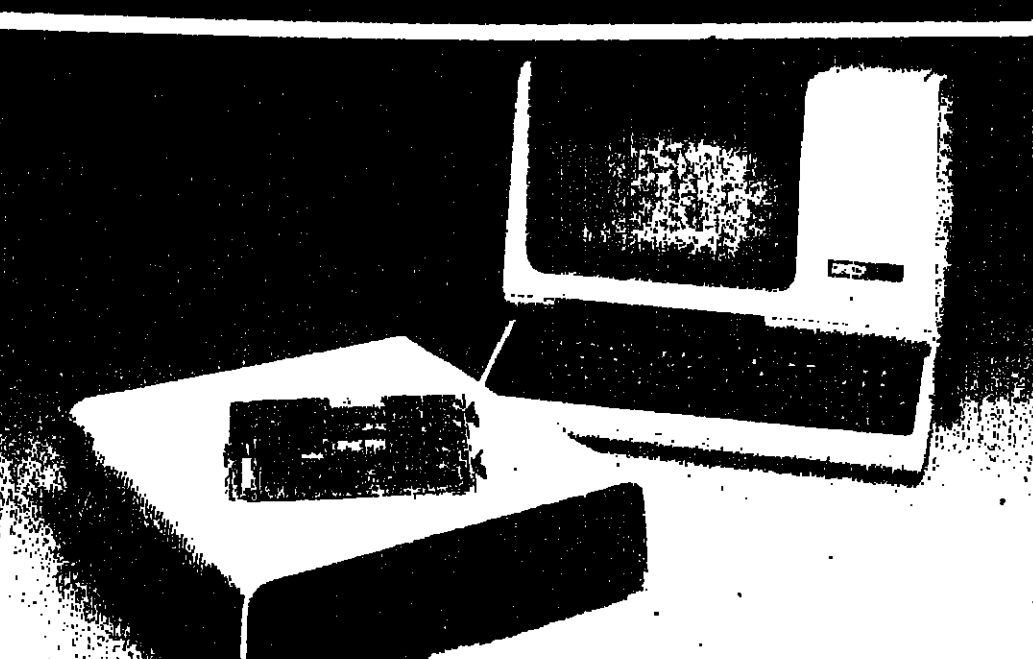
It is supported by CS Interactive Cobol and CS Business Basic.

As a physical image back-up system, the drive is claimed to be 62.5% faster and to store up to 26.1 Mbytes more (a 2,000% increase) than diskette back-up systems.

The new Winchester discs for the CS/50 and CS/70 systems continue the company's practice of providing more storage — 46 and 53% respectively — at less cost across all its product lines, according to Data General.

The fixed disc systems feature a single-board controller that simplifies maintenance and increases configuration flexibility. The two discs provide 36 new CS packaged system configurations, thus allowing highly tailored performance and functionality to match the needs of the small business computer user.

Data General (CW), Hounslow House, 724-734 London Road, Hounslow, Middlesex TW3 1PD. Tel: 01-572 7455.



DEC VT103 has 10 Mbyte Winchester and one Mbyte floppy disc.

## Mass storage for the DEC VT103

ARROW Computer Systems plans to market a complete integrated system comprising a DEC VT103 combined with the recently launched Arrowpak 525 mass storage system for LSI-11.

The Arrowpak 525 provides the VT103 with up to 12.6 Mbytes of formatted 5 1/4-inch Winchester storage (256 byte sectors) plus up to a further one Mbyte on 5 1/4-inch floppy disc.

The Arrowpak 525 overcomes a common objection to the VT103 — the current mass storage systems available from DEC are too large for many applications.

The Arrowpak 525 is styled for desk-top use and measures 40x40x10 cms. The unit is AC powered and a single ribbon cable links it to the DEC VT103. Lower capacity versions are available, the complete unfur-

matted capacity range being four, eight, 12 and 16 Mbytes on the Winchester and 250K, 500K or one Mbyte on the floppy.

This latest offering from Arrow will provide a complete computer system with mass storage at prices starting under £4,000.

Arrow Computer Systems (CW), Rosemount Tower, Stafford Road, Wallington, Surrey SM6 8RW. Tel: 01-647 0962.

put during the design process, says Versatec.

The Model 530 will produce check plots and screen dumps quickly, the company claims, and they allow the same Versatec printer plotter to produce high resolution plots of 200 dots per inch for finished output.

The Model 530 is considered

useful in CAD/CAM, remote plotting, hard copy, and seismic and mapping applications because the use of its 100 dots per inch reduces the raster data transfer burden by 75% and at the same time significantly reduces host computer rasterisation, says Versatec.

Remote plotting users, using the

100 dots per inch facility, can reduce transmission time by three-quarters with the straight raster data, and by significantly more when Versatec's compressed raster data format is used.

Versatec (CW), 27-35 London Road, Newbury, Berkshire. Tel: (0635) 42421.

AS PART of the development of its office automation plans, Philips Business Systems has made available a multi-line asynchronous (MLA) communications controller for its P7000 distributed processor.

The MLA offers users a microprocessor-driven controller capable of supporting up to 16 asynchronous lines. Together with the necessary protocols and device-handling commands in the P7000's Vision language, the MLA allows integration of devices such as barcode or OCR readers with conventional keyboard data capture at the P7000 workstations.

It also provides asynchronous interfaces with completely separate terminals, handprint devices, viewdata terminals, telex interfaces or factory data collection equipment.

Single line asynchronous communications are already used on the P7000 Databook system where it interfaces with telephone charge monitoring equipment in several international hotels.

Philips Business Systems (CW), Elektra House, Bergholt Road, Colchester, Essex. Tel: (0206) 575115.

Controller for Philips processor

you should take a look at North Yorkshire.

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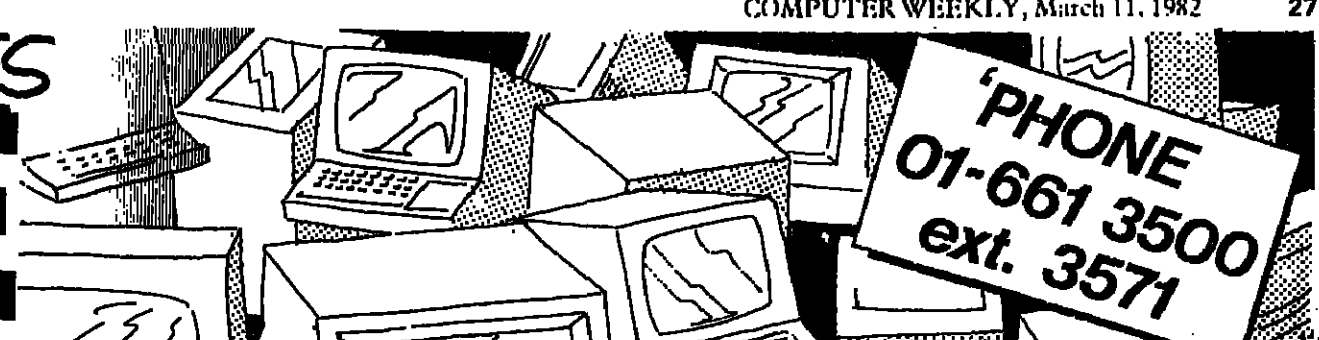
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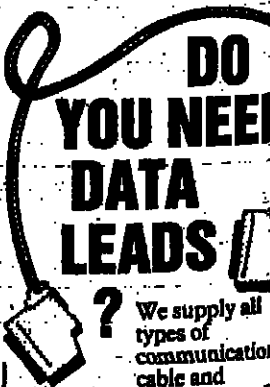
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6000 copies will be sent to established computer users or key personnel within government and major business organisations in the Middle East countries predominant in the computer market. The circulation was compiled through the full research resources of Computer Weekly and IPC Business Press backed by contacts made at the Gulf Computer Exhibition.

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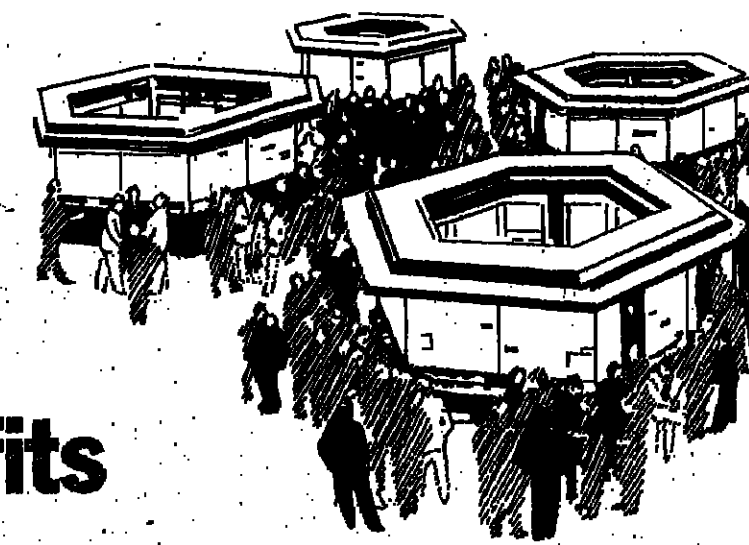
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## Senior Computer Programmer

Lucas Aerospace is a leading European manufacturer of aircraft components. Its Engine Management Division, based in Birmingham, is in the process of introducing a range of new manufacturing systems based on the IBM business package - COPICS. Computing is based on IBM 3033 Mainframes and 8100 distributed processors with MVS and DPPX operating systems. Applications are invited from experienced COBOL Programmers. Some experience of MVS, CICS, DLI or IMS would be an advantage. The successful applicant will work as part of a small team of analysts and programmers who are responsible for the implementation, maintenance and development of a range of manufacturing systems. Applications in writing to Mr P Wilkinson, Industrial Relations Officer, Lucas Aerospace, Shaftmoor Lane, Hall Green, Birmingham.

**Lucas Aerospace**

Our client, the leading UK Videodata manufacturer and distributor, seeks the following high-calibre staff as part of their 1982 expansion:

## Sales and Marketing Director

The successful candidate will have a first-class record, motivating and controlling a small specialised salesforce. He/she will be conversant with the videotex and micro-computer markets, and have experience in devising and implementing sales and marketing strategies in this field. Experience will include new product launches, and direct selling contact with both major national accounts and small business users. As overall responsibilities will include sales network development, sales literature and promotions, advertising and exhibitions, a record of personal achievements in these areas is needed. This is a senior appointment, likely to appeal to ambitious and experienced people aged 28-35. The job will involve travel both in the UK and overseas.

## National Accounts Sales Manager

This senior sales person will extend sales of videotex and micro-computer equipment to major national accounts - large companies, professional, administrative, educational and governmental bodies. Widespread travel will therefore be involved. Candidates (male or female) will need to demonstrate sales experience in this sector, and also the confidence and authority to negotiate directly at a senior level in systems, finance, and general management. You should be experienced selling systems and concepts, with a working knowledge of the technology involved, as well as selling hardware.

## Computer Development/Design Engineer

This versatile Computer Engineer will probably be aged 25-30, with a good Degree in Computer/Electronic Engineering. He/she is required to provide technically the development of current videotex terminals, and to evaluate and develop changes or improvements required by specific customers in the UK and overseas. There will be considerable customer contact through direct involvement in Q.A., and in responding to a wide range of client queries. The engineer will also work closely with the team developing new products, and may ultimately become directly involved in this area.

All these posts are based in Berkshire and will carry an attractive salary and benefits package, based on experience. To apply, please write to Confidential Reply Service, Ref ABC 643, Austin Knight Limited, Tiverton House, 51-53 Hagley Road, Edgbaston, Birmingham B16 6TT.

Applications are forwarded to the client concerned, therefore companies in which you are not interested should be listed in a covering letter to the Confidential Reply Service Supervisor.

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## Systems Analyst

You will report to the Systems Manager and have responsibility for the review, development and implementation of commercial systems (currently based on the site's ICL ME29 computer). A degree standard of education is preferred allied with 2-3 years experience in systems or computer related disciplines, ideally achieved in a manufacturing business environment. For both of these positions, we offer an attractive salary, bonus and relocation expenses (where applicable) plus a range of benefits including pension and sick pay schemes, subsidised canteen and social club facilities. For an application form, please contact our personnel officer Laurie Deadman, on Basingstoke (0256) 3191 or write to him at the address below. Alternatively our Answerline service is available outside normal working hours on 0256 22744.



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Plans for the future development to complement our sophisticated range of computer systems and terminal equipment has created the need for additional programming professionals. From our Croydon Plant we design, develop and manufacture specialist products for the banking, manufacturing and communications industries.

We are looking for Programmers and Senior Programmers with varying years of experience to work on systems design in the software capacity. Involvement will cover the following areas:

- ★ Operating Systems
- ★ Interpreters
- ★ User Interfaces
- ★ Maintenance and Diagnostic Test Routines
- ★ Data Communications

Some international travel is expected, primarily to the United States. Career prospects within the Company are excellent with provisions for transfer in the above subject areas being part of our development plan.

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- \* More than 4 years' design experience
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We currently operate an ICL and HEWLETT PACKARD based network using the IDMS and IMAGE data base systems. Experience with these product ranges would be advantageous.

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## Circuit Design Manager

Thames Valley: Salary to £15k

The Research and Development facility of an outstandingly successful, British, electronics company has a vacancy for a Design Manager to oversee the activities of a number of project teams. The successful candidate will be expected to have extensive knowledge of systems logic design and be able to translate queries and problems between silicon fabrication engineers and systems designers. A degree of B.Sc. in Electrical or Electronic Engineering is essential as is familiarity with the application of C.A.D. techniques to LSI and VLSI design. Applicants with the ability to identify and develop new product areas will be of particular interest to our client. Ref: L/10/B

## On-line COBOL Programmers

Central London: Salary to £11k+

Our clients are seeking several COBOL Programmers for their recently upgraded installation. You will be actively involved in the development and testing of a suite of programs written in COBOL for an on-line facility. It is an absolute condition that you offer a minimum of two years on-line COBOL programming experience, preferably gained in a mini-computer environment. A significant function of these positions will entail close liaison with the Company's financial and accounting personnel. Since the Company has ambitious plans to develop and implement a number of systems within the next year, successful candidates can expect early involvement in system design/analysis or an internal consultancy position. In addition to an above average salary, the Company offers a very low interest rate mortgage and a comprehensive range of non-contributory benefits. Ref: L/10/C

## Data Communications

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A highly regarded supplier of Hardware and Software Systems is seeking a number of Data Communications and Telecommunications Engineers for its Central London operations. Successful candidates, who should hold at least one numerate degree, must be fully aware of the high technology products currently available i.e. Word Processors, Local/Remote Area Networks and Message switching devices. Of particular interest will be those candidates who have a profound knowledge of communications protocol techniques i.e. X.25, SDLC/HDL, Good personal presentation skills are of paramount importance since you will be expected to liaise and co-operate with both technical management and non-technical users. All positions will entail a degree of travel within the Home Counties area. Ref: L/10/D

## FORTRAN Programmers

Home Counties: Salary to £9k

FORTRAN Programmers are urgently required by the design and development group of an engineering consultancy. Suitable applicants will probably be graduates who have a minimum of 1 year's industrial experience in a real-time mini-computer environment. It is essential for all positions that you offer fluency in FORTRAN and advanced knowledge of an Assembler would be a distinct advantage. Whilst there is no particular hardware requirement, there is a stated preference for candidates who have had exposure to DEC PDP11. These positions represent outstanding opportunities for applicants who wish to be involved in the design and development of complete systems in the engineering industry. Career prospects are excellent and there will be many opportunities for overseas travel should you desire. Ref: L/10/E

## Process Control Systems

Central London: Salaries to £15k

A Systems and Software House, with an excellent reputation for providing total systems solutions, has a number of vacancies for Programmers and Project Leaders with at least two years' Process Control systems experience. Suitable candidates for the senior positions will be required to have had responsibility for system hardware procurement, installation, commissioning and software generation, preferably in the chemical or oil industries. Applicants for the Programming posts should be fluent in an Assembler and a high level language such as Pascal or RTL2. Although the vast majority of work is in-house, occasional visits to client sites will be required and a degree of mobility is, therefore, essential. Ref: L/10/F

## Real-Time Computing

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On behalf of an expanding Systems Supplier and Consultancy we are seeking a number of Software Programmers and Applications Engineers. Of particular interest will be those who have participated in the development of a PDP 11 or VAX based real-time system or alternatively, have gained experience of simulation systems utilising any 32-bit minicomputer. Software expertise should include fluency in a high-level language such as RTL2, Pascal or FORTRAN with preferably a good knowledge of an Assembler as a subsidiary skill. Candidates who have also worked in a multi-processor environment will be especially welcome. Certain positions will entail a degree of mobility both nationally and internationally. Ref: L/10/G

## VAX Progs./Designers

London & E.E.C.: Salaries to £15k

A leading International Systems Company specialising in the development and sale of communications software is seeking Programmers and Designers for its Central London and overseas facilities. Suitable candidates should hold a numerate degree and have two years' subsequent programming or systems design involvement. Fluency in FORTRAN is essential and it is preferable to have had exposure to either a PDP 11/RX-11M or VAX/VMS configuration. Candidates who are fluent in a foreign language, especially French or German, will be of particular interest to our client. A degree of mobility is necessary since most positions involve both European and Transatlantic travel. Ref: L/10/H

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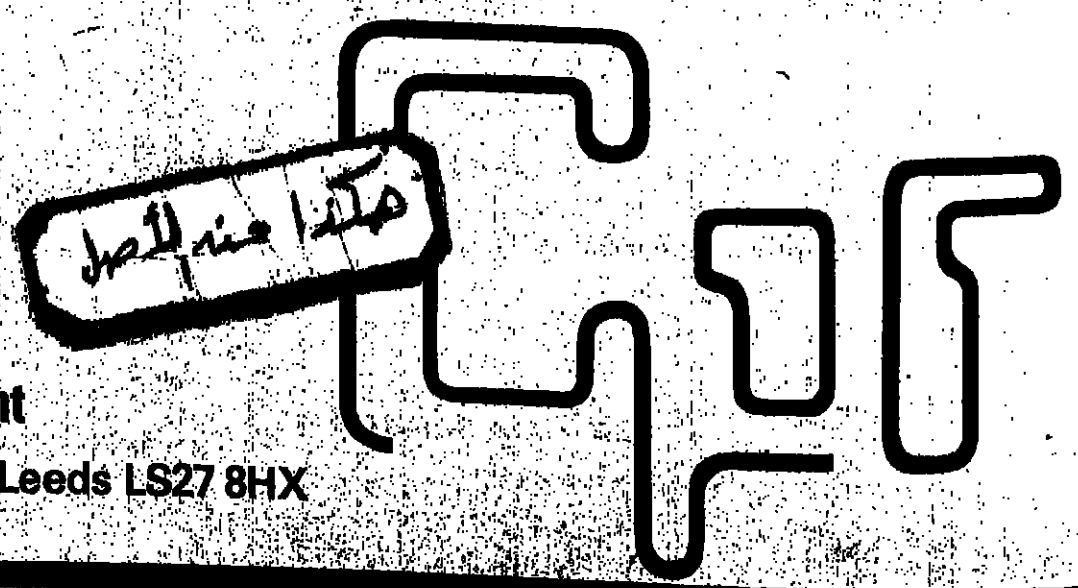
South Coast	IBM Programmers	to £9,000	Ireland	Consultants	to £11,000
N. West	COBOL Programmers	to £7,800			+ Car & benefits
London	Systems Eng. RSX 11M	to £12,500	N. West	Systems Analysts	to £12,000
E. Midlands	Programmers COBOL	to £10,500	S. Coast	Systems Engineers	to £12,000
	+ benefits				+ benefits
W. Yorkshire	Programmers COBOL	to £8,500	Lincolnshire	Analyst ICL	to £10,000
S. Yorkshire	Systems Eng. Furum, Coral	to £9,500	E. Midlands	Programmers RPG II	to £8,000
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These are unparalleled opportunities to design and develop a brand new CICS TP system with an international and highly respected consultancy. Clearly, this project will provide amazing and much sought after experience to those lucky enough to acquire a place on the team. In addition to this, and the excellent salary, the employment package includes a bonus scheme, pension scheme, free private health care, free life assurance, a discount stock purchase plan and opportunities for extensive travel. In return, the company expect a high level of commitment and a desire to extend your knowledge in database and teleprocessing technology. The essential skills are as follows:-

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Contact: Dennis Melling CW26 B

## Technical Author (French speaking) to c.£17k

**France**  
A world famous manufacturer of computers and computer systems, requires an experienced Technical Author at its Paris facility to work on varied and interesting projects. The successful candidate must have English as the mother tongue, have a good grasp of the French language and be technically conversant with micro/mini computer systems. Additionally, some experience of the following: the use of the Z80, CPM, BASIC, BAL, FORTRAN and/or COBOL would be desirable.  
Contact: Dennis Melling CW26 C

## Recruitment Consultants

We are still looking for personable, business-minded applicants in their mid-twenties who are interested in joining our committed and successful team when we move to our larger offices in Dursley.  
Contact: Mike Creamer CW26 D

If the advertised positions do not match your experience or aspirations, the Modus Consultants are always available for a confidential discussion of other vacancies available. An informal meeting – often an essential part of the process – can be quickly arranged.

## SWITZERLAND Package 17-22K

We are seeking a number of candidates to expand our team working in SWITZERLAND on one of the worlds most advanced Integrated Digital Communications Systems.  
All candidates shall have a proficient knowledge of GERMAN and shall have had experience in one or more of the following areas.

- \* DATABASE DESIGN
- \* MAN MACHINE INTERFACING
- \* VERIFICATION AND REVIEW OF DESIGN DOCUMENTATION
- \* REAL TIME DEVELOPMENT
- \* PROCESS CONTROL

## UNITED KINGDOM Package to 15K

We are also seeking candidates who will be prepared to relocate within the U.K. It is essential that candidates shall have a minimum of three years experience with a good knowledge of FERRANTI IN CORAL.

For further information phone 01-530 3186 or write with C.V. to the address below:

60, NEW WANSTEAD, LONDON E.11 2AD.  
**APPLIED Technology**  
Systems and Software Engineering  
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# GERMANY

These openings – with an organisation well known to us – are strongly recommended to candidates wishing to move to Germany. The client – a multi-national corporation – has its data centre in a town in the heart of the wine country, where the hardware comprises dual 4341's with 8100's as terminals. We have recruited a considerable number of British staff for the company over the last few years and they are now reaping the benefits of the higher German living standards as well as advancing their careers in a technically stimulating environment.

## IBM PROGRAMMERS

**PROFILE**  
Ideal candidates will be graduates in their twenties with sound IBM programming experience. Knowledge of on-line working and the technicalities of computing are the main requirements but training will be given to fill gaps. A mature personality with drive and determination and a strong commitment to living abroad are equally important.

**SALARY**  
Salaries can be anything from 50% to 100% higher than in the UK whilst living costs are similar.

**CAREER DEVELOPMENT**  
Training and career development are taken very seriously and some of our earlier recruits have already made significant career progress.

**LANGUAGE**  
English is the working language but a willingness to learn German for personal and social reasons is expected.

**ACCOMMODATION**  
There is excellent accommodation to rent at reasonable prices, and the company provides a good relocation package and help to locate a suitable apartment.

**INTERVIEWS**  
Client representatives will be conducting interviews in Nantwich on 25th March and in London on 26th March.  
For an initial discussion, ring me, Neville Jones, on (0270) 89708 office hours or on (0270) 215118 other times, or write to me at the address below, quoting Ref. 308/CW.

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## SWITZERLAND GERMAN-SPEAKING SOFTWARE ENGINEERS

Our client is introducing a new high-level language for large scale Software productions. An additional programmer is required to develop Software tools, debugging systems and utilities.

Successful candidates should have a degree in Computer Science, 2 years' of IBM or UNIVAC, used modern high-level language and have been involved with large Software development projects.

## SATELLITE COMMUNICATIONS BEDFORDSHIRE

A Software engineer is required by our client to join a small team developing this new and very exciting area of communications. Candidates should be in their mid to late 20s, a background degree in electronics or related subject, 2 years' experience of assembler plus a high-level language and ideally a mixture of PDP11 and INTEL experience.

## SCIENTIFIC PROGRAMMERS LONDON

An expanding division of a well-known Software House have immediate openings for the following projects:

Real Time Simulation Process Control, CAD Commercial + Control and Mathematical Modelling. Successful candidates should have one or more of the following: Minimum 2 years' Software Programming, RDP11, RSX11M, VAX 780, ASSEMBLER, CORAL 66, RTL2 and FORTRAN.

## SWITZERLAND GERMAN-SPEAKING SOFTWARE ENGINEERS

A major communications company require additional German-speaking programmers, to develop new communications Software. Candidates should have a minimum of 2 years' Real Time experience in this field.

## HARDWARE ENGINEER BEDFORDSHIRE

Satellite communications is our client's speciality. They currently wish to employ a Hardware Engineer with a minimum of 3 years' experience in industry. A degree background is necessary plus some involvement in Software Hardware experience of PTL and ECL design on micros would be ideal.

## ASHFORD SOFTWARE ENGINEERS

A company dedicated to Communications Systems is currently seeking engineers with a variety of the following:

- |                   |                 |
|-------------------|-----------------|
| IBM/ICL PROTOCOLS | V25             |
| DEC/RSV11/VAX     | DEFENCE         |
| CORAL             | INTEL 8086      |
| NETWORKS          | PROCESS CONTROL |
| EMULATORS         |                 |

## FRANCE IBM SYSTEM PROGRAMMERS

One of France's largest Computer Services Companies have openings for IBM Systems Programmers to work on a variety of our client's installations in a Systems engineering role.

Knowledge of French would be helpful, though a willingness to learn French is essential. Technical experience must include a minimum of 2 years' MVS experience plus related Software Tools.

## OPERATIONS RESEARCH PROGRAMMER/ANALYST

Our client's London-based operational Research/Scientific Systems group is currently seeking programmers with the following expertise:

- |                  |                    |
|------------------|--------------------|
| FORTRAN          | IBM                |
| MVS/TSO          | Honours Degree     |
| Min. 2 yrs' exp. | Financial Planning |

## REAL TIME SOFTWARE SPECIALIST SURREY

We are seeking applicants with several years' experience of Software Design. An implementation of Real Time processing. Ideally candidates will have experience of Field Support, Radar Systems RSX11, RTL2, Degree and high- and low-level languages.

## MIDDLESEX SOFTWARE DESIGNERS

An expanding division of a Software Engineering Company specialising in mini- and micro-based systems require additional designers. The company is developing several new projects in the Scientific and Engineering field and have exciting opportunities to offer. Candidates with at least 5 years' experience in one of the following areas:

Process Control, Defence Systems, Communications, PDP11, INTEL.

## COMMAND & CONTROL LONDON

One of the largest International Software Houses with their headquarters in London have a requirement for Software Designers with a minimum of 1 year's experience in Real Time Systems Design. Candidates should have a degree plus experience in one or more of the following:

- |                 |            |
|-----------------|------------|
| Defence Systems | CORAL      |
| Navcat          | VAX        |
| PDP11           | INTEL 8086 |

All the above appointments involve permanent positions and carry a wide range of salary and conditions dependent on location and experience. In the first instance please send us a copy of your CV (alternatively telephone for an application form) so we may discuss your application in confidence with our client on your behalf.

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Datamatics, Freeport, Surbiton, Surrey KT6 5BR

# ComputerWeekly

## SPECIAL FEATURE

## OPPORTUNITIES IN SALES & MARKETING March 25 issue

If you are looking for professional Sales and Marketing people, then Computer Weekly is the journal you need, because Computer Weekly reaches more sales people than any other weekly computer journal.

The March 25 issue provides an added bonus with our special editorially supported feature, highlighting the career opportunities for sales professionals. This is just one of many career-linked features to be published during 1982 aimed at helping readers improve their careers, and at the same time provide invaluable back-up for advertisers.

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# ComputerWeekly

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## CONTRACTS Middle East. Tax free + bonus and benefits\*

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We have contract positions open with our clients now and additional people will be needed throughout 1982. Contact us now to register. Current vacancies are for people with extensive IBM experience.

## Programmers + Analyst Programmers

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MARK IV - Industrial Systems, knowledge of Data Base + Utilities  
FORTRAN - For engineering applications, knowledge of MVS.  
PL1 and COBOL - Material Supply Systems using IMS.

## Business Analysts

People with substantial experience as Business Analysts are required for the UK and Saudi Arabia. Applications include: Housing Management Systems, Transportation Systems and Material Supply Systems. Experience of both batch and on-line systems required.

Also required:

Instructors, Software Librarian,

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For most positions we will require at least three years relevant experience. Middle East contract benefits include:

- |                                     |                           |
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**PERMANENT UK** Management Consultants required for Central London location with ability to communicate at a very senior level. Five figure salary. We also have current requirements for permanent staff to work in the Essex area.

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or telephone Southend-on-sea (0702) 333516  
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in 13 months time, our client will no longer exist. They will rise again as part of a new organisation, with even more opportunity for people to develop new and sophisticated computer systems.

The current DP staff will form the nucleus of a new department of committed and highly skilled DP professionals, who will have tremendous scope to develop the systems of tomorrow.

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**SENIOR ANALYST £12,000**

Not only will you deputise for a very overworked DP Manager, but you will control the analysis and be given a remit to successfully implement a major and

critical on-line database system comprising in excess of one million records.

Knowledge of this system will prove to be the basis from which significant new system development will evolve.

**SENIOR PROGRAMMER £10,000**

You will have the heavy responsibility of managing and training a team of three programmers to enable the successful implementation of this system to take place.

You will therefore be at exactly the right place at the right time, to take advantage of the significant systems development plans.

The hardware is based on an IBM 3031 running under MVS JES2 with Adabas as the database.

Programming is in COBOL.

However you look at it, the future will be a good one.

How good will be seen when you have replied to this advertisement, and received and read the package that we

will send you.

Unusual career moves require unusual action — so apply!

We look forward to discussing these opportunities with you in more detail.

Initial interviews can be conducted up to 8.00pm each evening, or on Saturday mornings by appointment.

Please send an Application Form and Company Profile to:

**0422**  
Recruitment Consultants

Surname \_\_\_\_\_  
First names \_\_\_\_\_  
Full address \_\_\_\_\_  
Position applied for \_\_\_\_\_  
Home tel \_\_\_\_\_  
Work tel \_\_\_\_\_ Ext \_\_\_\_\_

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## Technical Support S/W

W. M'sex to £13.5K + car

Take this opportunity to join one of the most successful computer companies of our time. You will need several years' technical software experience to include: real time, data communications and/or database systems. Analysts with banking or financial systems experience would also be of interest. You cannot fail to be impressed by this client. Higher salary but no car for City Office location.  
Contact Terry Harvey.

## Applications Support

H. Counties c. £11K + car

Two experienced support specialists are required for a very successful financial modelling and management information package running on S/34 and S/38. Candidates should have previous user support experience, accounts knowledge and interactive computing experience. Central London base but mostly working from home, you will need to be resourceful. Pre & post sales, installation and training responsibilities.  
Contact Tim Bridges.

## Tech. Micro Application

N. Bucks £8K to £11K

A small, high calibre development team working on the application of micro processors to industrial and scientific measurement and instrumentation is seeking a software person with a good hardware understanding of architecture and machine interfaces. Experience with I.E.E.E. 488 Interface, 8080/85 and Intel MDS 800 kit, plus programming in Assembler and PLM would be advantageous.  
Contact Terry Harvey.

## Analyst Programmer

Herts. to £10,000

A fast expanding computer manufacturer has an opening for an analyst/programmer to work in its own internal DP department. Preference will be given to candidates of graduate level with over one years' experience preferably in Basic but training will be given where necessary. A current driving licence is essential for visiting different company locations.  
Contact Tim Bridges.

## DEC Project Managers

S. Beds to £12,500

There are openings for two Project Managers in this expanding scientific development group. The client is a subsidiary of a large international manufacturer of scientific instruments. DEC/RSX-11 is used in a control and executive mode at the centre of complex computer and instrumentation systems. A scientific qualification with DEC and supervisory experience would be attractive.  
Contact Terry Harvey.

## Compilers Op. Systems

Herts. c. £8,500

An interesting and unusually attractive opportunity has arisen for a programmer with 12/18 mths. experience on micro or mini based systems software. The successful candidate will be required to join a small team of specialists, writing compilers and operating systems. Our client is a leading US company now expanding its UK operation.  
Contact Tim Bridges.

## Technical Support H/W

Berks. c. £11K + car

The product range and reputation held by this client has made it a world leader in the highly competitive and expanding field of data communications. Candidates must have detailed technical knowledge of modems, multiplexors, data concentrators etc., plus a suitable client relation manner. Product training provided. An excellent opportunity for advancement.  
Contact Terry Harvey.

## Networking X.25 L.A.N.

Beds/Herts. £10K-13K+

You will be an experienced data comm. person, probably with a background in binary protocols. In more recent times you will have been involved in X25 projects and be up-to-date on recent developments in networking. Tasks vary from internal consultancy to team leader responsibility for design and implementation. Positions are with expanding engineering development groups.  
Contact Terry Harvey.

## Control Systems S/W

Beds. £8K-£11K

Our client specialises in computer controlled industrial applications and mechanical handling processes using PDP11, RSX11 and Intel microprocessors. Projects are varied and interesting with limited site installation and testing. Candidates need to be self starters and experienced Assembler, level programmers. This is a small, growing company with prospects for promotion dependent on merit.  
Contact Terry Harvey.

## Tech. Analyst Banking

London. c. £12K+ + +

A major international bank operating (w/in IBM 4341s) is seeking a Technical Analyst. The person appointed will be responsible for liaison between systems programmers and the operations department to ensure the smooth introduction of new systems onto the bank's computers. Very thorough knowledge of DOS/VSE and CICS/VM needed. Low mortgage, free meals, season ticket etc.  
Contact Tim Bridges.

Write, or telephone us during office hours as below.

Any other time call Terry Harvey on: Great Missenden (02406) 4705, Tim Bridges on: The Lee (024 020) 502.

We are always ready to discuss these and many other interesting positions.

HR

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HR



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Processes with at least one years experience in Assembler Programming to work on a new and exciting range of micro based products in Brighton.

We offer the normal benefits associated with a national company together with more than competitive remuneration

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Although it is preferable that your experience has been gained within the computer industry, consideration will be given to those applicants with a proven record in business equipment or office product sales.

For further information contact Brian Mawdsley quoting Ref: 5783.



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To be responsible for the general operation of a third-generation computer. This will entail introducing modifications into existing applications programmes, writing simple supplementary programmes, preparing check sequences or adapting them to the hardware possibilities as well as checking the execution results and checking databases.

In both cases, the main qualifications are an education to 'O/A' level standard or the equivalent work experience, at least three years' professional experience in one of the above mentioned fields and a knowledge of two programming languages - one of which should ideally be COBOL-ANS. The date of birth of all applicants must be after 31st December 1941.

The conditions of employment with the Community in Brussels include:

- \* A net monthly salary (after all deductions for social security, income tax etc.) of between BF 68,000 (around £708) and BF 69,500 (around £765) - including an expatriation allowance.
- \* Family allowances - where applicable.

To obtain a copy of the notice of competition and the compulsory application form, please write (preferably on a postcard) to: Service du Personnel - Secrétariat Général du Conseil - rue de la Loi 170 - B 1048, Brussels.

The closing date for submission of the official application form is the 15th of April 1982.

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We are looking for someone with: management experience or considerable potential; comprehensive experience of ICL equipment and systems (plus awareness of Mr. Wilmot's developments); a sound knowledge of COBOL and T.P.; a committed approach and the personality to promote this installation to encourage users.

We offer flexible working hours, 26 working days holiday, car loan facilities and reduced rate membership of BUPA. Assistance with relocation expenses and housing may be available.

Contact the Personnel Officer, Salisbury District Council, Bourne Hill, Salisbury, Wiltshire, SP1 3UZ (Telephone 0722 6272 Ext. 278) for an application form and further details.

Closing date: 25th March, 1982.

Interviews to be held on 29th March, 1982.

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to be based in the London and Leeds areas. The successful applicants may have a manufacturing background and will be familiar with current computer hardware, preferably in the clothing or textile industries.

The job function will involve systems development; extensive client contact and the building of a user base in the North of England.

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We are looking for a high flying computer professional (male or female) who can have considerable impact on the running of our business. Knowledge of P.O.S. systems and communications is desirable as much development is planned in this area. Likely age range 25 - 35 years.

Remuneration package will not be a problem for the right candidate and includes car, B.U.P.A. cover, Non-Contributory Pension and Bonus Scheme.

Interested? Then please write or telephone in confidence to:- Monica I. Watson, Personnel Manager, Peter Lord Ltd., P.O. Box 2, STREET, Somerset BA16 0YH. Telephone (0458) 42131 ext 2175.

Peter Lord

COMPUTER PROGRAMMERS/  
ANALYSTS

Applications are invited from computer programmers/analysts for a post of PROJECT ASSISTANT within the Clinical Information Science group in the university department of Surgery (St. James's Hospital, Leeds) for work on a national Computer-Aided Diagnostic Project. The post is available immediately for a fixed term of up to three years with possible continuation thereafter. Applicants should have a degree, preferably in computing or statistics.

A good knowledge of micro-computers, including PET and APPLE, is required (in particular experience with BASIC systems and file handling systems run on BASIC computers).

Informal enquiries may be made to Mr. F. T. de Dombal (0532-33144 ext. 5668).

Application forms and further particulars may be obtained from the Registrar, The University, Leeds LS2 9JT, quoting reference number 110/2. Closing date for applications 25th March, 1982.

CONTRACT  
PROGRAMMERS

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- \* DL1 COBOL - OS/VS2 MVS BEDS.
- \* Data general COBOL - AOS/VS LONDON
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- \* IBM 8100 DPCX

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This position carries a high percentage of on-site work so candidates must be prepared to travel.

The company is offering an excellent salary, good career prospects and a very stimulating environment.

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Specialising in the installation and support of the IBIS 38 System, custom designed for the IBM System 38 and currently the most advanced and comprehensive banking information system of its kind, ideally you will have:

- \* A minimum of 2 yrs RPG II Exp.
- \* Sound Knowledge of System 34/38.
- \* Experience of financial/banking applications.
- \* Enthusiasm, self-motivation and ambition.
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- \* Organisational skill to utilise time effectively.

If you would like to play a significant role in the future success of this dynamic company and

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or 328 1606, quoting ref: 6015.



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Package to £12K

£14K for exceptional  
experience and ability

In addition  
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Salary range £15-20,000

A leading multi-national software house with associated distributors worldwide is seeking a Manager to run their European Data Centre Product Development Group. Parallel department functions exist in the areas of Product Planning and Education, Technical Communications and Marketing Communications.

The Company are market leaders in IBM OS & DOS Data Management and Data Dictionary products. They have an in-house data centre with approximately £400K of hardware and are seeking an effective Manager capable of running a group of approximately 25 Designers and Programmers working on a number of development projects. The personnel resource budget is approximately £1 1/3 million p.a.

This position entails overall technical responsibility as well as project and budgetary management functions. You will also have to ensure cross product integration and compatibility in a family of dictionary driven products. An effective communicator is essential to ensure ongoing user liaison.

If you have a proven track record in the management of IBM development projects and are strong enough to take on this significant level of responsibility please telephone either Jenny Dalrymple-Hay or Roger Allington on 01-493 2947 during the day, or respectively Beaconsfield (04940) 4579, Little Gaddesden (044284) 3536 (evenings/weekends), quoting reference 9838.

DALROTH & PARTNERS LTD 4 HALF MOON STREET LONDON W1

(0604)

Our clients, a successful European Computer Manufacturer, have embarked on a major expansion programme in the U.K. As part of this, they are committed to establishing a major presence in South Yorkshire. Additional specialist systems and software personnel are therefore required to take advantage of these super ground floor opportunities which have excellent career prospects.

The Data Communications Specialist will provide Technical Support to customers and colleagues mainly in a Post Sales environment (although some Pre-Sales work may be involved). Major areas of responsibility include:

- Data Communications Software
- T.P. Monitor Software
- Associated Hardware

The successful applicant should have at least five years DP experience in a Technical environment with at least two years' experience of developing and supporting large Data Communications Networks. He or she should possess skills in some of the following Data Communications areas.

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- Writing Data Communications Software
- Understand the functions of Hardware Components
- Use of Testing/Fault Finding equipment e.g. DataScope

SENIOR SYSTEMS DESIGNER -  
TO £12K

Experience in the design of screen based systems and a thorough understanding of file design is essential.

OPERATING SYSTEM SPECIALIST  
TO £10K

Technical Support experience and Operating Systems background on mini-computers required.

PROGRAMMERS - TO £7.5K

Experience in COBOL and/or ASSEMBLER.



## Design Engineer

Bucks £9K-£11K

We are currently seeking a professionally qualified Design Engineer to work in a senior capacity for a prestigious communications manufacturer. Applicants must be capable of demonstrating their utilisation of both Analogue and Digital design techniques together with, ideally, a background in active-filter design. Ref: 5746.

## Customer Support Engineer

Home Counties up to £8,500 + Car

Our Client is an established Data Terminal manufacturer looking to increase its field engineering resources. Customer Support Engineers are required to maintain an existing range of terminals, VDU's and micro-processors, faulting to component level, in an area encompassing North and East London postal districts and surrounding counties. Initial product familiarisation will take place at the Head Office in the South West. It is likely that the successful applicant is currently enjoying either a field service role or seeking a move to field engineering from R & D, and is qualified to at least ONC level in electronics. Ref: 5775.

## Field Service Engineer

London up to £7,000 + Car

To meet the demands of steady growth, our Client - a leading manufacturer in the field of computer peripherals - is in the process of recruiting an experienced Field Service Engineer. Ideally candidates will be in their mid-twenties and familiar with the faulting of data terminals, VDU's, daisy-wheel and matrix printers to at least board-level. Although emphasis is placed on relevant experience, a formal qualification would be an added bonus. Ref: 5773.

For further information please contact Robert Hughton quoting the appropriate reference.



**Lloyd Chapman Associates**

123, New Bond Street, London W1Y 0NR 01-499 7761

## JOIN THE MARKET LEADERS

Due to rapidly expanding business opportunities, we are looking to increase our expertise and the services we offer to our clients in Europe. We thus require the following additional staff:

### EUROPEAN SUPPORT REPRESENTATIVE

You will lend your skills to the support of an established European distributor network for our range of communications storage devices. A hardware background, experience in communications and in both pre-sales and post-sales environments is essential. You will need to be disciplined in your approach and be self-motivated. The ability to speak a foreign language would be advantageous.

### SOFTWARE DESIGNERS

These are two senior appointments, one of which will be as the assistant to the present European Software Manager. Candidates will bring to these positions their experience on 8502/6809 design, as well as micro-processor applications + experience at both Assembler and high level.

Successful candidates can expect a five figure salary and good fringe benefits.

Please apply in writing, enclosing a c.v. to:

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(0712)

## C.A.D./M. Systems Management

A vacancy exists within our CAD/M team. The job will involve the use of our existing five terminals (Computervision) for CAD together with the link to CAM on two CNC Milling Machines.

Key areas of the job will include management of the systems standards, writing of software, training of new operators and assisting with demonstrations of the equipment.

The position will be particularly suited to a man or woman with an engineering background and computing skills. This will enable an effective contribution to be made to Engineering operation which is involved in the design and development of instrumentation and systems of cars for the future.

Please write with brief career details, including current salary, to David Bagshaw, our Personnel Officer at the address below.

**ais SMITHS INDUSTRIES**  
automotive instrument systems ltd.

317 Edgware Road, Cricklewood, London NW2 8NN.

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## Microcomputer/Word Processing

### Towards Sales Management

£14-18K + Potential with basic & car

Our Client is a sales and marketing oriented business computer system company who have from scratch in the last two and a half years created a turnover in excess of £1.6M. Professionally managed, they are dealers and agents for a number of highly successful hardware and software products aimed at solving small business users' problems.

There are two requirements, the first for Sales Professionals who must be self-motivated, professional salesmen with ambition to run their own branch. Not necessarily having a computer sales background but being able to demonstrate the ability to generate their own marketing action. Strong on empathy and drive. Areas: Norwich, Cambridge and South Essex.

## A Product Development Manager

The Second a Product Development Manager who will ideally have software selling/marketing experience and be creative and pragmatic in his/her marketing approach, coming from a computing or allied background. Market sympathetic, able to evaluate new programmes and select and prepare product launches based on sound research. Their responsibilities include the launch, conduct dealer training, organise all associated marketing action and material. Based Colchester.

We have prepared comprehensive job specifications and client profile which we shall be pleased to send to suitably experienced candidates. In the first instance, please phone David Anderson on 01-824 1044 quoting reference 472F or 473F respectively, or write in confidence to Trojan Engineering Services, Forest House, 166-168 Station Road, Chingford, London E4 6AN.

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Included in the teaching duties will be the provision of computer education for students studying - course leading to:

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BEC/TEC National Certificate/Diploma in Computer Studies  
BEC National Certificate/Diploma Computing options

Stamped addressed envelope please for further particulars and application forms from the Vice-Principal.

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DEC VAX/VMS

£10,500 + profit share South West

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To provide second level support to our customer engineers. You should have at least 5 years' practical knowledge of mini and micro computers with peripheral experience on storage discs, tape units and VDU's. Applicants should either have formal qualifications up to HNC in electronics/computer studies or possess relevant experience.

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These positions offer an excellent opportunity to join an expanding company with good career and salary prospects. Relocation will be provided if appropriate.

For further information or application form please contact:  
Rob Wilson, Personnel Officer,  
Rediffusion Computers Limited  
Kelvin Way, Crawley, West Sussex RH10 2LY. Tel: (0293) 31211.

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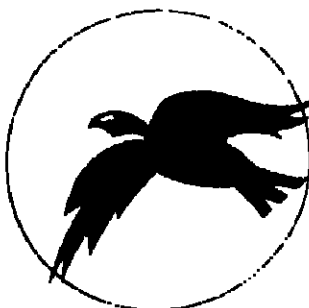
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## ANALYST PROGRAMMERS

We are a highly successful company manufacturing precision engineered products for a world-wide market.

We currently use an IBM System 34 with 13 terminals, a processor of 256K and 256MB disk capacity.

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Currently various System 34 packages are being analysed to determine their use in our future development programme.

The successful applicant will have had considerable experience in industry to include commercial, financial and production functions and have had at least 4 years EDP experience.

An extensive knowledge of IBM System 34 is required and knowledge of IBM System 38 would be desirable.

A competitive salary will be offered together with the benefits associated with a progressive company. Substantial relocation assistance will also be provided where necessary to this pleasant rural area where housing is favourably priced.

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If you feel you could apply your technical knowledge in a retail environment, apply in writing to: Mrs C. A. Smith, c/o Ryman Ltd, 19-20 High Holborn, London WC1V 6BS.

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Application forms and further details may be obtained from the Staffing Officer, The Hatfield Polytechnic, P.O. Box 109, Hatfield, Herts. AL10 9AB, or telephone Hatfield 88100 extension 309.

Please quote Ref: 482. Closing date: 19 March, 1982.

### COMMERCIAL ANALYST

Beas Water & West Limited, a Regional Operating Company of Beas PLC, have a vacancy in their head office at Cardiff for a Commercial Analyst, to assist in the development and implementation of local and Group computer systems.

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Salaries are reviewed annually in September and effort and enterprise duly rewarded. The Company also operates a Pension Scheme.

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The work will be technically challenging - responsibilities include the specification and design of both hardware and software including special purpose bit-slice processors and sequencers involving microprogram design.

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Benefits to make your move easier.

Our client can offer an attractive package to suit individual needs. This includes:

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If you would like to hear more about our client's growth plans for 1982 contact Peter Hatherley or Colin Hush on 01-938 1804. This location is right for you.

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The successful applicant will have:

- \* Two years' experience of computing
- \* Knowledge of at least two computer languages
- \* The ability to write clear English

Send a CV and examples of your written work to The Editor,

## Practical Computing

Quadrant House, Sutton SM2 5AS

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Candidate must have a minimum of six years' programming/analysis experience and be fully familiar with all aspects of the appropriate application areas. Thorough knowledge of FORTRAN and COBOL in IBM OS or UNIVAC 1100 environment is required. Must be able to communicate with users and DP staff at all levels. Previous experience in a supervisory position would be an asset.

This position offers a unique opportunity for a person with an interest in this area to play a major role in the provision of tariffs data to the airline industry.

Interviews will be conducted in London week of March 22.

Detailed curriculum vitae should be received at the following address no later than March 18.

International Air Transport Association  
Greener House  
66/68 Haymarket  
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### Systems Analysts

Clarks Limited is the largest manufacturer of branded shoes in the U.K.

To give further impetus to the development of a range of new commercial systems, we are now looking for two Systems Analysts.

The successful applicants will work in a progressive IBM installation and will have a record of achievements in the areas of system development and implementation. Experience of order handling routines and/or warehousing procedures would be an advantage.

We offer a starting salary of around £10,000 p.a., together with an annual bonus and non-contributory pension scheme. A full relocation package is available to those who will need to move house to this very attractive part of Somerset.

Please write to John Holdaway, Staff Services Manager, Clarks Limited, Street, Somerset for an application form or phone Street (0458) 43131, ext 2661.



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